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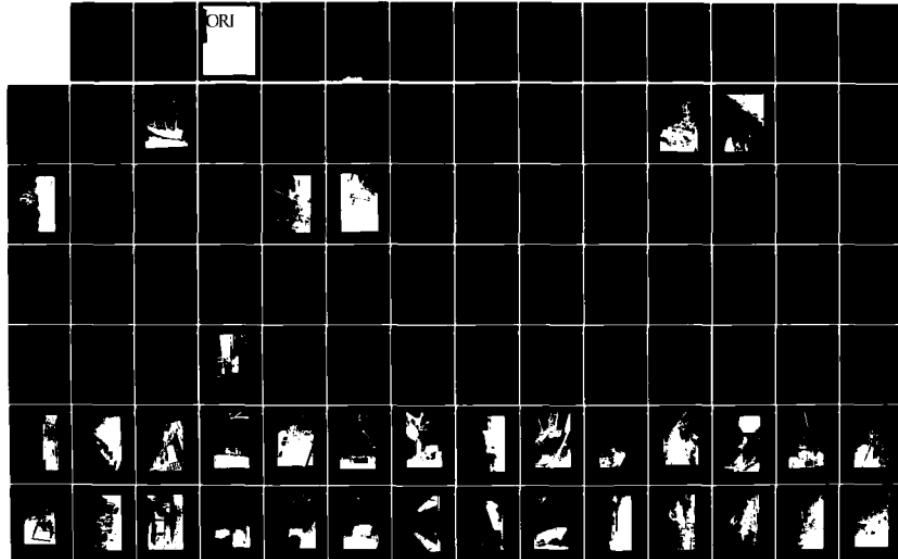
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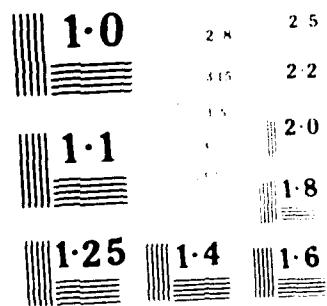
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**HEAVY-LIFT BREAKBULK SHIP PRETEST RESULTS OF
THE JOINT LOGISTICS-OVER-THE-SHORE (JLOTS)
TEST AND EVALUATION PROGRAM**

25 JULY 1977

**PREPARED UNDER
CONTRACT NUMBER MDA-903-75-C-0016
FOR THE OFFICE OF THE SECRETARY OF DEFENSE
DEPUTY DIRECTOR (TEST AND EVALUATION)
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Entertainment	Deployment	Joint Test	Lighterage

The major objective of the Heavy-Lift Breakbulk Ship Pretest was to determine the capabilities of the Services to use such a ship for deploying selected Logistics-Over-The-Shore (LOTS) equipment to a site where fixed port facilities do not exist. This test was the third of five planned preliminary tests of the Joint LOTS Operational Test and Evaluation Program conducted under the sponsorship of the Deputy Director (Test and Evaluation), Office of the Director, Defense Research and Engineering. The pretest was conducted from anchorages off Sewells Point, Norfolk, Virginia, and Ft. Story, Virginia.

In the first phase of the pretest, LCT-3, proved the concept feasible and the Army's interest in the concept. The pretest provided an opportunity to evaluate the potential limitation in the amount of derating to the crane's rated capacity, if any, when it is operating on an unstable surface. Further findings are expected in a later report to be published by the Naval Ordnance Test Station which will be utilized during the LCTS main test.

The first task assigned to the pier was to form a pier at the beach. The Celong, a 100-ton capacity barge, was moored, was braced, jacked-up, ramps lowered, and the pier was built on the barge's deck. The pier with the 140-ton crane was used to lift 100-ton containers onto the barge.

The second task assigned to the pier was the Army's 300-ton capacity crane which was moored to the pier. The 300-ton crane was used as a crane-on-beach container loader. The pier was used to support the crane-on-beach and the 140-ton crane in its offloading operation. The inability to reach containers in lighters from the pier was overcome by using JAPCO-1's - were successfully and conveniently off-loaded from the pier. A Newhaven ferry was employed to load containers onto the pier. This operation was using the TCCF, but wave motion and conditions of the pier made this difficult. The chassis made this operation too time-consuming. The Newhaven ferry was successfully used to lighter containers at sea and then transported to the pier where a frontloader rapidly off-loaded them onto the pier. The pier was then jacked down.

During the pretest, the Services' capabilities for using mobile equipment to support the landing of heavy and oversized equipment, particularly the 300-ton crane, were evaluated. Because of its weight and size, is the largest piece of equipment ever to land on the beach since the first opportunity in over 4 years to do so has been provided by LCTS. This opportunity provided the experience and knowledge which will be amplified during the main test.

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ABSTRACT

The primary objective of the heavy-lift Breakbulk Ship Pretest was to determine the feasibility of the Services to use such a ship for deploying conventional heavy-lift equipment to a site where fixed port facilities were not available. The pretest was the third of five planned preliminary tests of the Heavy-Lift Breakbulk Ship Test and Evaluation Program conducted under the direction of the Heavy-Lift Test and Evaluation (Test and Evaluation), Office of the Secretary of Defense, Defense Engineering. The pretest was conducted from November 1976 through January 1977 at Norfolk, Virginia, and Ft. Story, Virginia.

The pretest, conducted 14-16 November, 1976, was part of an evaluation program which included a test exercise in August, 1977. The heavy-lift ship was tested to demonstrate the capabilities for deploying newly procured heavy-lift equipment in their ready-to-use configuration. It was anticipated that a container-oriented throughput system could be established more rapidly if disassembly requirements were minimized. Operational reliability would also be greatly improved because the detailed disassembly required for conventional breakbulk ships, containerships, and roll-on/roll-off ships was eliminated for the heavy-lift breakbulk ship.

The primary objective of the pretest was to conduct a container-oriented throughput demonstration to evaluate the feasibility of the Services. This objective was implemented by the pretest and after eliminating potential technical problems associated with the pretest.

The results of the pretest indicated that equipment could be deployed with minimal disassembly and emphasized the continuing need for the heavy-lift breakbulk ship. It is estimated time savings are on the order of 53 hr in deployment of the 100-ton capacity crane with minimum disassembly. This is compared to the time needed for the more detailed disassembly required when only conventional breakbulk ships are available.

The heaviest item loaded was a 146ft-class LCI that weighed 190 tons. A 164ft-class LCI was scheduled for loading but lacked an appropriate sling. A recommendation was made that such a sling be included as part of the ship's equipment. Except for the 300-ton crane, all equipment was loaded/unloaded without difficulty. Handling of the 300-ton crane was complicated by the fact that it was rigged incorrectly. Also it had to be placed in the LCI backwards so that the combined center of gravity of the LCI with the crane was far enough astern to be safe and seaworthy. Consequently, after it was backed out of the LCI, the crane had to be turned around on the beach, a move that delayed the crane's operational readiness for several hours.

During the container throughput phase a temporary containership discharge facility (TCDF), an Army 140-ton lifting capacity crane mounted on a Delong barge, was used by military personnel to unload containers from a ship for the first time. A previous exercise, COTF II, proved the concept feasible on a larger barge using civilian operators. This pretest provided an opportunity to instrument the crane for an evaluation on the amount of derating to the crane's lifting capacity is necessary when it is operating on an unstable "floating" platform. These findings are expected in a later report to be published by a Naval laboratory and will be utilized during the LGTS main test.

A Delong barge was also used to form a pier at the beach. The DeLong, with ramps and a 140-ton crane aboard, was beached, jacked-up, ramps lowered, and made operational in approximately 18 hr. The pier with the 140-ton crane was then used as an unloading facility for containers.

Also tested for the first time was the Army's 300-ton capacity crane which was placed at the high water line and used as a crane-on-beach container unloading facility. Both the 300-ton crane-on-beach and the 140-ton crane on the DeLong pier were hampered by an inability to reach containers in lighters at low tide. Amphibians—LARC-LXs and LARC-YVs—were successfully and continuously used during calm seas. A causeway ferry was employed to load containers on milvan chassis at shipside using the TCDF, but wave motion and container alignment difficulties with the chassis made this operation too time-consuming. The causeway ferry was successfully used to lighter containers at low tide and river barges to the beach where a frontloader rapidly off-loaded the containers and placed them on milvan chassis.

In summary, the pretest verified the Services' capabilities for using a heavy-lift breakbulk ship to deploy certain LCU, heavy and oversized equipment. The LCU, item not considered feasible, because of its weight and size, is the Delong barge. The pretest also provided the first opportunity in over 4 years to conduct a container throughput exercise. This opportunity provided the experience required by military personnel which will be amplified during the main test.

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TESTS OF SPREADERS

1. Spreader calibration - This test is to determine the amount of material spread by a given spreader. It is recommended that the spreader be calibrated at least once a year. The test consists of spreading a known weight of material over a known area. The area is determined by marking off a square or rectangular plot. The size of the plot will depend upon the size of the spreader. A plot of 10' x 10' is suitable for most spreaders. The area is then measured and converted to square feet. The weight of material to be spread is determined by dividing the total weight of the spreader and its load by the number of spreader units. For example, if a spreader has two spreader units and a total weight of 10,000 lbs., the weight per unit would be 5,000 lbs. The weight per unit is then multiplied by the area of the plot to determine the amount of material spread. The amount of material spread is then converted to cubic yards. The conversion factor is 1 cu. yd. = 27 cu. ft. The amount of material spread is then divided by the area of the plot to determine the amount of material spread per square foot. The amount of material spread per square foot is then converted to cubic yards. The conversion factor is 1 cu. yd. = 27 cu. ft. The amount of material spread per square foot is then converted to cubic yards. The conversion factor is 1 cu. yd. = 27 cu. ft.

I. INTRODUCTION

BACKGROUND

The principal objective of the heavy-lift breakbulk ship pretest was to determine the capabilities of the Services to use a vessel of this type to:

- Deploy heavy and outsized, mission-essential, Logistics-Over-The-Shore (LOTS) equipment to an off-shore site,
- Off-load and transport the equipment to shore in landing craft deployable aboard the ship, and
- Prepare the equipment on the beach for LOTS throughput operations.

A secondary objective, conducting a container-oriented throughput operation, was added to the pretest by the Services for training purposes and for identifying potential unforeseen technical problems during the LOTS main test. These objectives were accomplished in an exercise conducted November 1-9, 1976. The test began with the ship at anchorage in Hampton Roads, Virginia, where equipment was loaded and continued off Ft. Story, Virginia, where ship discharge and throughput operations took place.

The heavy-lift breakbulk ship pretest also offered a less obvious but important feature besides verifying the deployability of new equipment. There is rarely an opportunity for deployment of very large and heavy equipment, especially if handling by military personnel is required. The paucity of heavy-lift ships and the cost, difficulty, and infrequency of repositioning outsized, heavy equipment have diminished the familiarity and skill of military personnel in dealing with such equipment. Accordingly, it was found that some "rediscovery" of the special equipment and handling considerations was necessary for supporting this type of operation.

The major difference between the two tests was the test conducted at sea. In the first, all equipment was assembled in the ship's port or the ship's forecastle deck, while the bulk of equipment was transported to the forward general breakbulk cargo deck and the "dry" cargo deck tested, isolated earlier. The second, 1983 test, fully tested examined the capability of the forward and rear cargo spaces and all other handling equipment items within the ship's port, as well as the rear deck, including the cargo handling equipment items within the rear deck. Thus, the availability of the equipment was not limited by the availability of the rear deck. This type of arrangement is believed to be the only way to examine the availability of equipment required to support rear deck loading time in the available area. In turn, the availability of resources can be established through the rear deck.

With the exception of the rear deck, equipment planners cannot anticipate that these are the types of equipment and redundant items in the equipment mix. For example, the various dollys and container handling equipment used to transport different components of a tank unit will have to be tested and incorporated before the tank's ownership arrives. Thus, the extent of planning the rear deck will play a key role in the availability and reliability assessment of the rear deck's support capabilities.

SHIPS

The ship used for the tests was the SS TEAROOL MEA (see Figure 1), a 17,000 DWT crude oil tanker that was rebuilt in 1965 with modern, heavy-duty equipment and extra large deck superstructure. The ship was rebuilt for long-term charter to MARITIME ENERGY Company, Inc., and the rear deck of the ship is the largest deck in the company's fleet. As part of the MEA charter fleet, the TEAROOL MEA and its sister ship are among the most readily available vessels. Based on the rear deck's weight of 450 t, a long-term, two-year, full-breakbulk charter of the ship at \$120,000 per month (in assembled or rear deck configuration) plus a 10% surcharge, the TEAROOL can provide a significant availability, but there is a limitation in number (three), and it has a limited availability availability, except for the event of ship requirements due to operational emergencies.

The availability test results for the conventional breakdown of the rear deck of the ship for two ships, the TEAROOL and the SS TEEBEE, which have substantially similar configurations, are shown below (see Table 1).

As shown in Table 1, the availability test results for the conventional breakdown of the rear deck of the TEAROOL and TEEBEE show that the availability of the rear deck is approximately 80%.

In the January 1983 test, the results of the conventional breakdown of the rear deck of the ship were as follows: TEAROOL TUV test and TVI test, January 11, 1983; TEEBEE, January 12, 1983; and TEEBEE, January 13, 1983.

As shown in Table 1, the availability test results of the conventional breakdown of the rear deck of the TEAROOL and TEEBEE show that the availability of the rear deck is approximately 80%.



FIGURE 1. A RECENTLY ARRIVED FISHING VESSEL FROM THE NEW ZEALAND
FISHERIES.

heavy items such as a Mac, LARC-EIs, and locomotives. Second, there are three 100-ton deck-top lattice boom cranes, 100 ft in length which permit loading large heavy items in holds 1, 3, and 4. The 100-ton booms can also be paired to work together giving the ship a nominal 240-ton lifting capacity, permitting the hoisting of an LCM. A total of four LCMs can be stowed on the main deck. Figure 2 illustrates the capability for use singly or paired. The general characteristics of the two heavy-lift breakbulk ships are contained in Table 1. Appendix A contains more detailed information on ship characteristics.

TABLE I
GENERAL CHARACTERISTICS
S.S. TRANSCOLORADO AND S.S. TRANSCOLUMBIA

Type of vessel	Single-screw (4-1-4) transport converted to heavy-lift
Original ship	Heavy-lift capability of 140 tons
Vessel was originally built in 1945 and converted by Newport News Shipbuilding and Drydock Co., Newport News, Virginia in July 1965	
Length overall	500 ft 14 in
Length between perpendiculars	394 ft 11 in
Breadth, molded	71 ft 6 in
Depth to main deck at side, molded	40 ft 6 in
Draft to established waterline, molded	30 ft 4 in
Displacement in salt water	31,100 tons
Deadweight	11,475 tons
Craft horsepower - normal	9,100
Continuous sea speed	16 knots
Light ship characteristics	
Displacement	10,225 tons
Vertical center of gravity, AG	37' 83" ft above keel*
Longitudinal center of gravity, LCG	236' 94" ft fwd 36' 4" aft
Officers and crew	38
Number of cargo holds	7

* The TRANSCOLUMBIA's master and chief mate reported that on one occasion the ship had loaded and discharged a 300-ton tugboat.

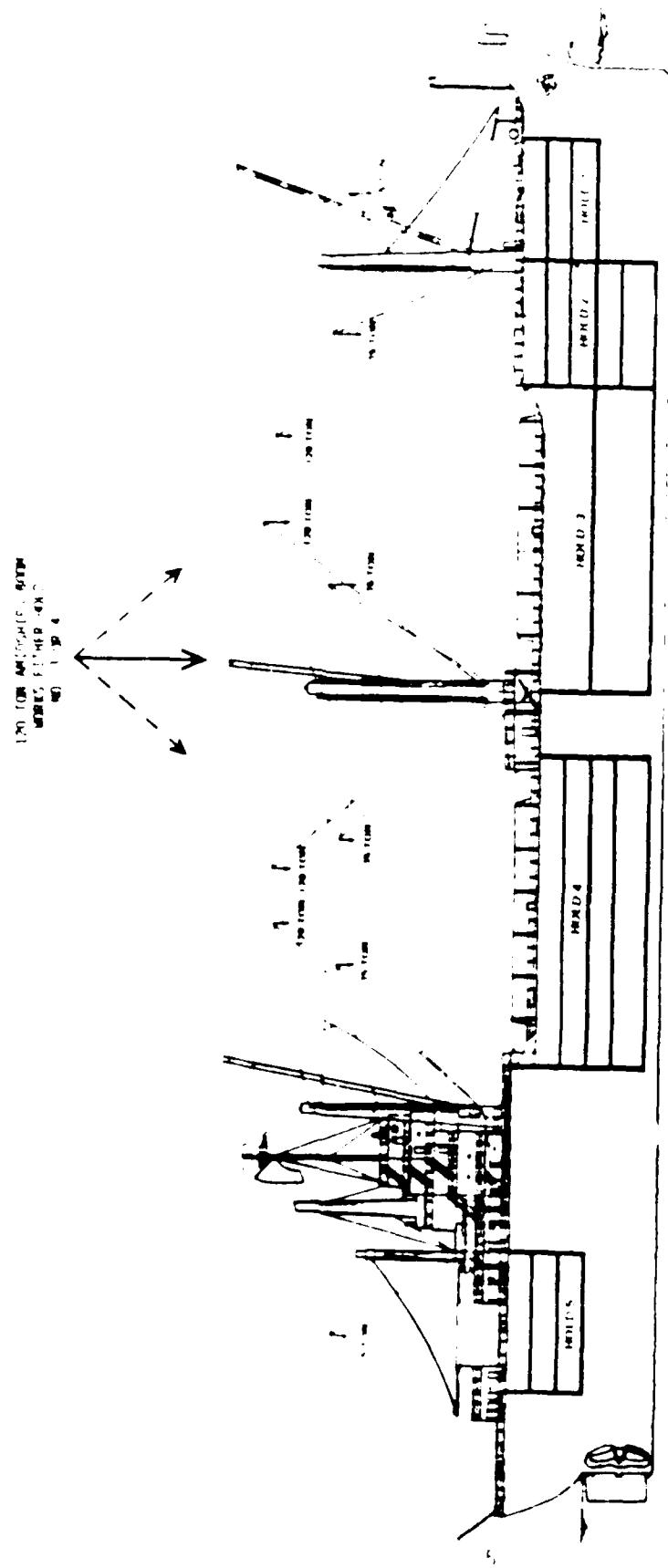


FIGURE 2. HEAVY-LIFT BREAKBULK SHIP PROFILE

TESTS

The first three components selected for this project were the heaviest equipment. Among the requirements was a mobile, containerized ramp at a 17% slope that would fit on a flat deck of a ship. Other criteria eliminated, eventually, only the last two because of the characteristics of the ship. The results of the latter are given below.

Four items originally included in the original test design report were not tested initially:

- The 10-ton truck crane, which vehicle could not be satisfactorily transported in early developmental tests.
- The 10-ton overhead gantry, which presented a redundant lift since the ship's crane was being tested on a one-sided lift situation, which is dangerous at 17%.
- The new type of roll-on/roll-off which had not yet been invented from the original design.
- The heavy-duty derrick, which handling was not evaluated.

The largest lift required was one in which it was needed to transport the entire boom to the deck when undocked in a tactically-disassembled configuration. The undockability of the crane is defined as the minimum disassembly necessary to move the telescope forward. In a tactical disassembly the crane, which was the heaviest component, had all sections of the boom - except the telescope - removed along with the counterweights and counter-jib floats. The weight of the telescope, counterweight, and counter-jib (from approximately 150 long tons) was measured in the assembly time in the test. This is as opposed to the conventional strategy of more extensive disassembly into components of less than 100 long tons each to other ships and requiring a few days for reassembly.

The 10-ton truck crane (10-ton lifting capacity) is smaller and lighter than the 10-ton crane and has suitable load for an LCM, which has a capacity of approximately 10 short tons and can be deployed on most commercial ships. To the shipping project, the 10-ton crane was loaded into an LCM but loading from a heavy-lift breakbulk ship presented different problems (discussed in detail later in this report).

Finally, the GAF-100 was embarked for the first time in the 1978 project period. The heavy-lift breakbulk ship was the only ship tested that had the lifting capability (more than 10 long tons) and space available to support in charge the GAF-100.

Another type of test, for instance refers to the Army landing pier and the temporary on-ship discharge facility (ASDF). The latter is a deck-mounted with a large crane mounted on it. The ASDF is positioned alongside a landing ship for unloading operations.

TABLE 2
HEAVY-LIFT SHIP PRETEST PLANNED LOADS

Lifts Planned	Characteristics					Remarks
	Lift Made	Length (Ft)	Width (Ft)	Height (Ft)	Weight (Tons)	
100-Ton Model (100-ton lifting capacity) Crane, tactical disassembly	Yes	57.6	12	13.5	98	
100-Ton Model (14-ton lifting capacity) Crane, tactical disassembly	Yes	48.5	11.3	9.4	42	
100-Ton Model (14-ton lifting capacity) Crane, tactical disassembly	Yes	62.5	26.6	15.3	88	
140t-Class LCT	Yes	119	34	17.8	180	
140t-Class LCT	No	135.3	29	17	151.8	No sling available
100-Ton Model Sideloader	Yes	41	12.5	11.7	64	Top handler removed.
100-Ton Frontloader	No	32.5	13.2	16.5	69.3	Not received in the inventory. Top handler removed.
AGV-30	No	76.3	33	21.5	27.7	Not available for loading
3 x 15' Causeway Section	No	90	21.3	5.1	60.3	Lift was redundant*
10-Ft Milvans	19	20	8	8	-	Weights varied by container
4-Ft Container	1	40	8	8	30	

* See WRI Technical Report No. 1037.

TEST OBSERVATIONS (CONT'D)

During the equipment deployment aspects of the test the most important observations were to check the physical feasibility of moving the LTC equipment with the ship's crane system, once in the objective area, making the equipment available for the safety of operations. Thus, observations were concerned with matters such as centering, centers of gravity (did the item hang in an appropriate position), clearance of lift slings with lift points, any pendulation problems associated with counterweight, and the like. Times required for deployment of the different items were measured to support main test planning. Crane cycles and other throughput data samples were also obtained. The throughput rates and all the factors that influence them were additional inputs to main test planning.

During the ship off-loading measurements were made of the sea state and of the motion of the TCC platform. An ancillary test to measure the stresses in the superstructure of the TCC was also conducted. These measurements, made by personnel from the Naval Civil Engineering Laboratory at Port Hueneme, California, will be the subject of a separate Navy report. The results may assist the Joint LTC Test and Evaluation Program by establishing better safe working limit criteria for the TCC crane working in this environment.

Finally, observations were made of the way various equipment functioned in the environment and of cargo documentation and control procedures.

III. OPERATIONS

OFF-LOADING SUMMARY

This operation began about 0700 hr November 2, 1976, with the T-AK-11, MEIA at anchor off Sewells Point in Hampton Roads. Weather conditions throughout the loading and discharge phases of the pretest were clear with a light-to-calm wind and calm seas at both the Sewells Point anchorage and off Blue Beach, Ft. Story.

Preparations for loading required approximately 3 hr and included the setting of batches and the loading of Dunnage, cargo rigging sets, and luffing equipment. The luffing was accomplished using the ship's 120-ton booms which were designed to move very large objects and, hence, move rather slowly. Eventually, the first day, only containers and the LARC-LX were loaded before darkness halted operations. In most ships round-the-clock operations are difficult but with the heavy-lift ship this is not advisable because of the extremely long booms (100 ft) and the need for the boom operator to constantly watch the line passing through the sheaves at the boom tip. This is difficult to observe at night since artificial light at the 10-ft distance is inadequate.

The first lift on the second day was the 1466-class C, which was lowered on the starboard side of Hold No. 4 without difficulty. The 9125 crane followed with, was hoisted and stowed in the well deck of the C. At hold No. 3 the 6250 crane was loaded on the port side and the sideloader on the starboard side. All lifts were made in a fairly routine fashion except for the 6250 crane which was lifted with a pronounced fore and aft tilt.

Off-loading began about 0730 on 4 November after the ship had moved to an anchorage off Blue Beach, Ft. Story. The order for off-loading was the C, crane, sideloader, the 40-ft container, the 9125 crane, the 1466-class C, and the LARC-LX. Only the 6250 crane posed any difficulties and this was

The first task was to get the 18-ton crane, by early afternoon of the previous day, into the dock. At the end of the day, the 18-ton crane was fully operational and ready to serve 10% of the working hours, or 100 tons.

The next task was to get the heavy-lift system operational. A team of 12 men, 10 sailors and 2 officers, were used to lift the 18-ton crane into the ship's hold and after this, 10 sailors, 2 officers and 2 men from the ship's company, who were picked up at the pier, were used to move the 18-ton crane to the 3-ton crane. The 3-ton crane, which weighed 10 tons, was eventually used to exercise the heavy-lift system, until the 18-ton crane was freed from the holds of the ship. This took 1½ hours until the ship's charter period was completed. A 1½-hour period was also required during the exercise as a substitute for the ship's 3-ton crane. It was during the 1½-hour delay and to the 3-ton crane that the first difficulties due to adverse weather conditions were experienced. However, no wind greater than 10 knots and the current activity was possible. The ship was towed to the pier.

The second task was to get the 18-ton crane ashore from the pier. During the night, 10 sailors were used to transport the crane ashore. The 18-ton crane was then lowered, the equipment was removed, the counterweights were dismantled, and the 18-ton crane was transported ashore, the calculated rate of less than 500 yards per hour, and the crane was secured for movement's statement.

4.2

The third task was to load the 18-ton crane with the 12-ton heavy-lift system. The 12-ton counterweight beams were used to support deck operations, such as the preparation of the deck, operation of the heavy-lift booms, as normally, the 12-ton counterweight beams are used to support the heavy-lift system of special heavy-lift equipment, such as the counterweight beams, the large hatch covers, the counterweight beams, the counterweight beams each weighing 10,466 lb and the 12-ton counterweight beams each weighing 10,466 lb. As such an hour may be required to load the 12-ton counterweight beams. An such an hour may be required to load the 12-ton counterweight beams due to adverse weather deck activity, although hatches may be closed, it may be necessary to open them for loading or off-loading equipment, such as the 12-ton counterweight beams, during the start-up time.

The fourth task was the unhooking of the 18-ton crane and the 3-ton crane from the pier. The 18-ton counterweights were lifted to become the through-holds of the ship's deck, and the 3-ton counterweights were lowered to the pier. After the removal of the 18-ton counterweights from these holds, the 18-ton crane was lowered to the deck required an average of 15 minutes each. The 3-ton crane required 10 minutes, free floating, paid for duty, because some of the counterweights had weight and a lengthy change of boom and rigging would have been necessary. Only the 120-ton beams were used.

For the next lift, a 20-ton crane held to No. 3, the 120-ton beam between No. 3 and No. 4, was used because it had the most availability to maneuver the load. Since the 120-ton beam carrying hold No. 4, it was necessary to swing it over. To do this, the beam was moved over No. 4 hold and passed through a top hatch, which was open, and it was moved over the other side to No. 3 hold. This

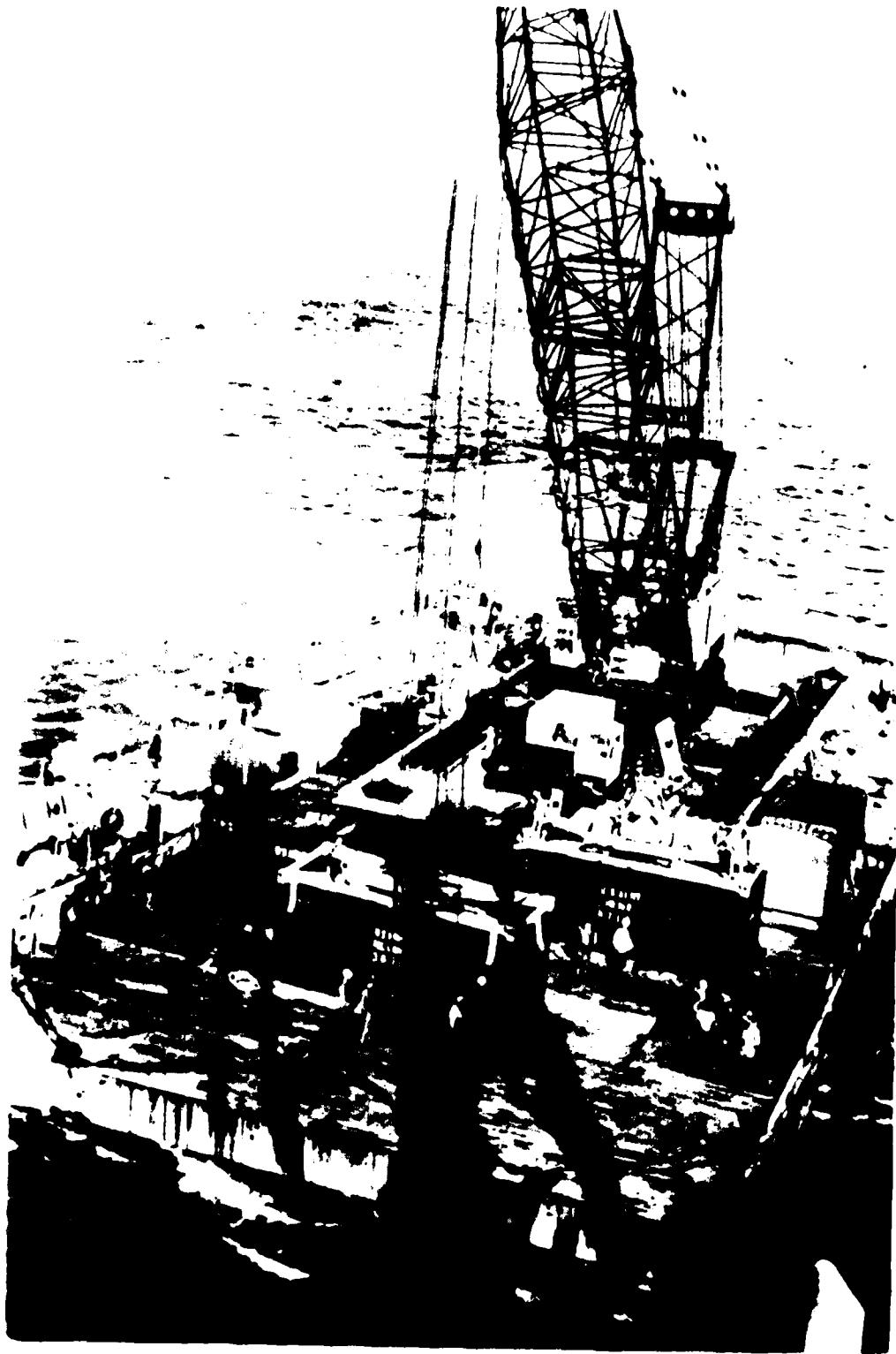


FIGURE 3. TEMPORARY CONTAINERSHIP DISCHARGE FACILITY



the time required to bring the litters to the ship deck, the time required to bring the litters to the dock, the time required to bring the litters to the pier, and the time required to bring the litters to the pier. The total time required to bring the litters to the pier was approximately 1 hour 45 minutes.

The following is a general summary of the personnel and time required to load litters. In the title, the elapsed time between the start of the loading of the first litter until the time required to bring litters off alongside and all gathered at the loading point and until operations are secured. Because there were two separate loading cycles, times are considerably longer than the time required to bring the litters to the pier. The litters were brought to the pier in half the litter-offer time segment. The following table gives the approximate litter-offer times segment by segment. In the remarks column, to illustrate the amount of time required to load litters, after "My" (the author of this report) had been requested to make the comment, he said it largely depended on the number of litters per segment, therefore, the following table is not the optimum capacity, therefore, the litter-offer times given in the table do not agree with other segments of the operation. The following table listing the capacity of the litters, the number of litters per segment, and the litter-offer times, since litters are termed "litter-offer times" and not "litter-offer segments".

The following table gives the approximate capacity, number of litters per segment, and litter-offer times for each segment. The litters were loaded at the loading point and all gathered at the pier. The pier was adjacent to the loading point, therefore, the litters were loaded at the pier. The pier was adjacent to the pierhouse truck which was used to transport the litters to the pier. The pierhouse truck had a center-of-gravity clearance of 10 feet. The pierhouse truck had a center-of-gravity clearance of 10 feet. All litters and were loaded.

No difficulties were experienced in the loading of the litters. The litters were loaded with the stevedores to debark the litters having to move the litters from the pier to the pierhouse truck, and correcting a malfunction of a lift crane were the only difficulties experienced in loading the litters. Using the lift truck sky lift feature, the litters were moved from the pierhouse truck to the pier. The pierhouse truck had a center-of-gravity clearance of 10 feet. Nevertheless, no major problems were experienced.

The pierhouse truck, which at approximately 60 tons, was the largest of the pierhouse trucks, was the fastest. It required the shortest time to get to the pier, including preparation time to attach the litters.

The first two heavy-lifts were the Army truck cranes. Both were in the same configuration. Each crane had been designed to be able to move so that it would be more nearly ready for use after being transported. The crane had to remain attached on each crane and otherwise had to be moved to the needed additional clearances. A previously used lift crane, because of the size of the lift crane or the lift which is larger, was used. The lift crane had provisions for accommodating various center-of-gravity heights. It consisted of a series of holes in a spreader bar at the end of the crane boom. The distance between the spreader bar and the heavy-lift truck was considerably different from that previously used was tried. A vertical steel cable lifting was used instead of steel cable loops. This last procedure

TABLE I
EFFECTS OF VARIOUS CULTIVATING METHODS ON THE GROWTH OF COTTON



FIGURE 5. ATTACHMENT POINTS TO ADJUST SPRAGGED BAR FOR CENTERS-
LEGEND: 6250 AND 9125 AND 9445

was successfully, although there were minor delays in inserting the strap under the frame of the lifting frame and also in manhandling the loops of the strap over the middle bulkhead of the ship's heavy-lift boom.

The smaller crane, the 9125, was lifted first. There was a delay while the crane upper was rotated 180 degrees. The boom base was over the crane truck cab in the final configuration. After a test lift the crane was set down again in the L-1 and the nylon loop inspected. The lift was then made without any further delays.

The lift of the 6250 crane was the final heavy lift and was the only one that required an on-the-spot decision. The same lifting frame that was used for the smaller crane was used for the 110-ton 6250 crane lift. As the lift started, the lead nosed up. The front wheels were about 3 ft off the deck before the rear wheels began to lift clear. The crane boom, facing the rear, slanted downward toward the ramp of the LCL it was being lifted from. If the lift had continued, the boom presumably would have come in contact with the top edge of the ramp. Experience in the breakbulk ship pretest¹ had shown that even seemingly minor bumps impacting on the tubular frame of the crane boom can cause shifts that seriously affect the maximum lift capability of the crane. Thus the possibility of contact had to be minimized.

The way to avoid the problem would have been to re-rig the lift so that it remained level. This would have involved shifting the lift point at the apex of the lift frame from one point to another in the series of holes available. However, such re-rigging would have been time-consuming. A decision was made to continue the lift, but to first lower the LCL ramp so as to provide increased clearance. This was done and the lift proceeded with the crane at a pronounced slant. As the crane started downward toward the deck of the ship the tilt would have caused the boom base to make contact with timbers on the hatch top before the crane wheels made contact. To avoid this possibility caused a delay of about 15 minutes. The crane was repositioned in such a way that the boom base was located over a gap between the crane hatch number 3 and the deck house. This allowed the crane wheels to touch before the tip of the boom base. With that problem solved, the lift was completed.

The total time required for LCL, including delays, was 2 hr and 12 minutes. There were three delays: 15 min waiting for the LCL to tie-up in the proper position, 10 min for the crane to work on initial ballasting, and 15 minutes for the crane to be readied for unloading. Upon completion of lashing of this lift the ship weighed 9,100 tons deadweight.

REF-1. N.Y. ANNUAL REPORT 1977

General

All lifting of the heavy lifts began at 0700 EST, November 4. The weather was clear and the winds were calm. In the most part the order

¹Operational Research, Inc., report on results of the Conventional Breakbulk Ship Pretest of the First 110-Ton Over-The-House (OTH) Test and Evaluation Program, TRT Technical Report No. 1137, TRT Author TRT.

the equipment. Equipment was the reverse of that for training. In general, steel casting proceeded at a rapid rate and, with the exception of the F-270 system, early equipment preparation as there was completed in a timely fashion so that throughout activity could begin. Table 4 provides a summary of equipment steel casting times and time required to make the equipment ready for operations.

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The front lift bar was attached to the center crane. The rigging used to load the lift bar again used, however, so no stiffening was made to the structure to connect to the lift bar. This meant that the crane was off-centered to the left of the main crane so that the lowest point on the crane when being transported was to the wheel, but the base of the crane was sensitive to the right. The lift bar went straight to the left wheel so where the ramp hinged, the lift bar was offset to the left by about 10 centimeters from the boom front. Since the left wheel did not have the deck, the boom front had to be lowered to get a clearance under the deck. The center lift bar was lowered to the left with its center. Figure 6 shows the center lift bar on the crane with it lowered with its center. In addition, the bar for carrying the center lift bar was compensated for its center. Figure 7 shows the center lift bar being lowered at the

In the first half beat, as stated before, the rate would have been one-half each beat, but it still would have been necessary to load the ship evenly. Unfortunately, the ship would be loaded unevenly with the weight of two men, so that at the time of the lifting frame interferes with the center of gravity, with the angle of 45° forward, the center of gravity would be about one-half the penetration of the ship. Therefore, if the beach the ship would be broken off the landing craft or current, and, before it would be possible to get away, the ship would be crushed, and the landing craft would be lost.

The one with the black stain probably had about 1000 water-leaf after rain stopped. It was about 1000 feet above sea-level, at two and three-quarters miles from the coast. The water-leaf was represented by small stems, 1-2 inches long, with 2-3 leaves. The leaves were mostly strap-shaped, the petioles being very short, which makes them look like grass. The stems were surrounded with myriads of what are called "leaf-litter". Another 1000 feet above sea-level, the trees became more and the water-leaf decreased greatly. The water-leaf was still present, but the number of plants was very small.

The result of the time spent on the beach will be determined by the number of hours' survival necessary of the body, otherwise they spend at least 100 hours of time having the whole equipment that is normally recommended to a 1000-lb. aircraft and military practice. It is evident that all the time must be given the airplane and the fact that the airplane will operate over the rest of the time, when where its flight capability will be greater than over the truck, the 100 hours will be the time required to make the airplane ready as contained in the table.

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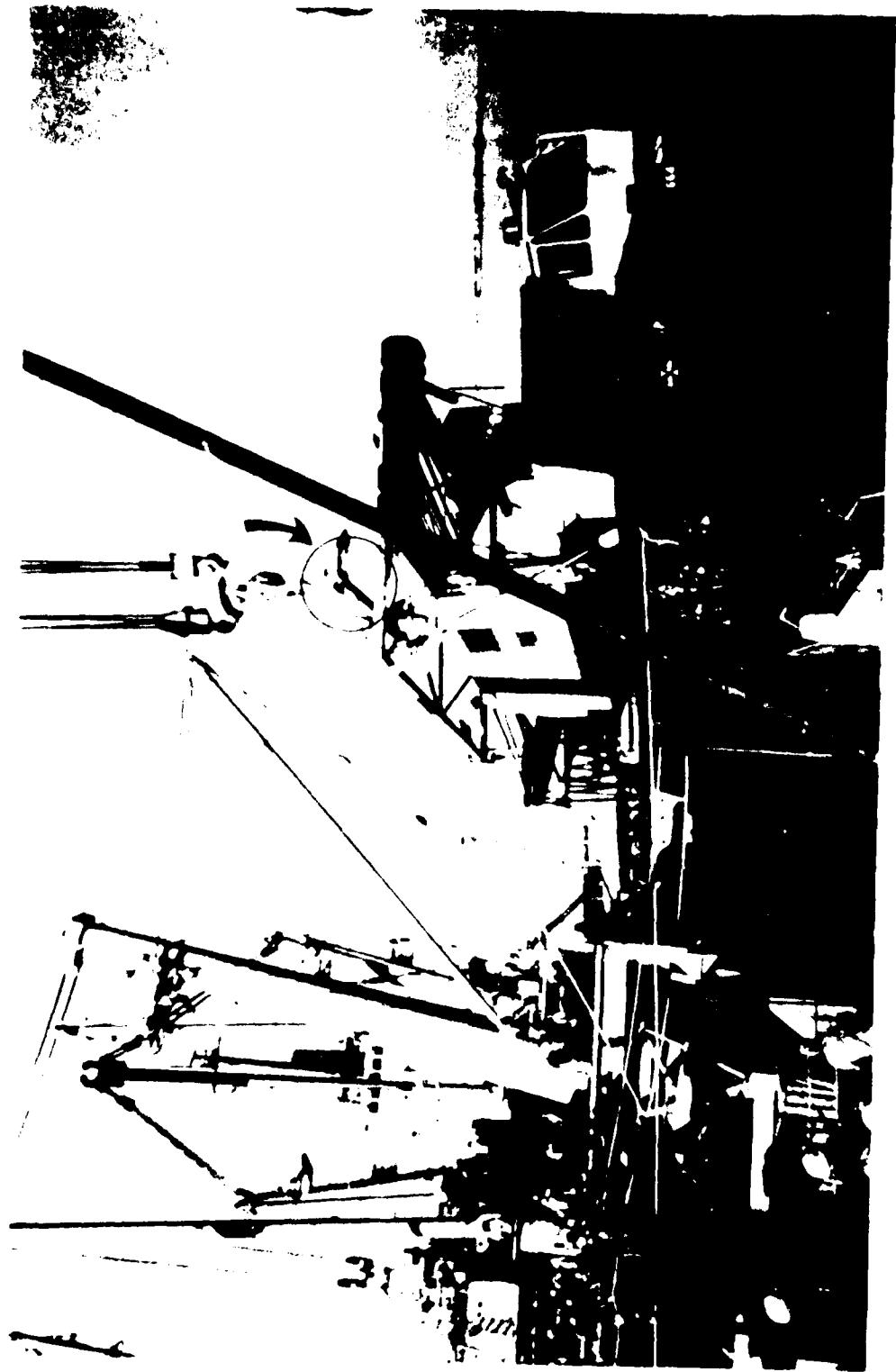


Figure 1. A photograph of the author standing on the deck of the ship during the survey. The ship was sailing from the port of Pernambuco, Brazil, to the port of Rio de Janeiro, Brazil.

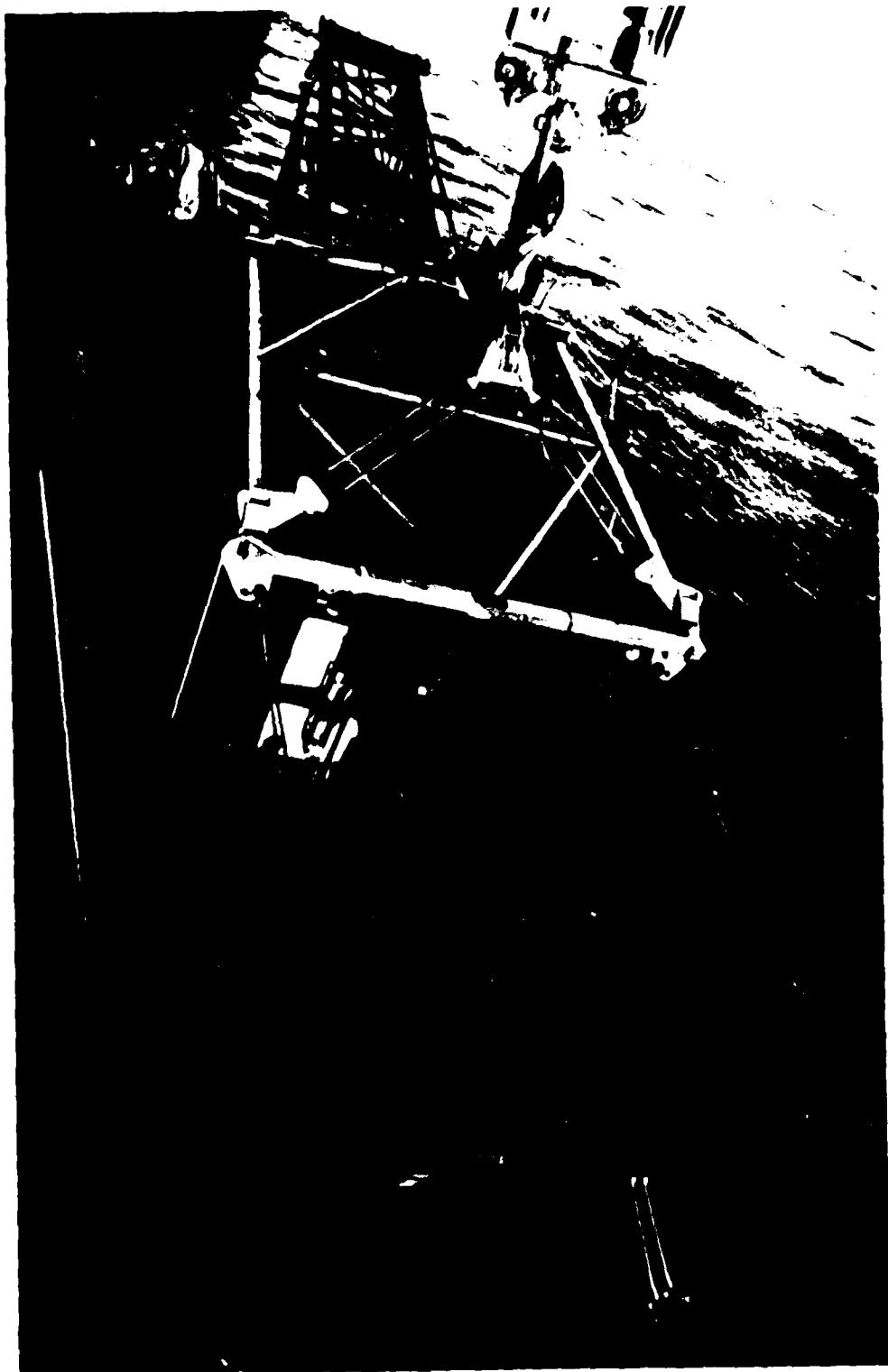


FIGURE 10 - CRANE BEING LANDED IN DUE WITH FRAME DOWN

THE UNIVERSITY OF TORONTO LIBRARIES

On the other hand, the first two terms in the right-hand side of (2) are the same as those in (1), so that the difference between the two equations is the third term. This term is proportional to $\partial_x \phi$, and it is negative if ϕ is positive. Thus, the third term in (2) is negative if ϕ is positive, while it is positive if ϕ is negative. This shows that the solution ϕ is stable if it is positive, and unstable if it is negative.

The probability of getting the same amount of the bed load is based on the following distribution:

- The driver was able to stop the car in 10.44 seconds, which is faster than most drivers.
 - The car had a greater than average lateral stability, which is good for cornering at speed.
 - The car had a decent amount of grip, but it was not as good as the other cars, because the front wheel grip was lower than the rear. The wheels of the car were not balanced, which caused the car to drift to the left when cornering.
 - The car had a very good grip on wet roads, but it was not as good as the other cars, because the grip was not as strong as the others. The car also had a tendency to drift to the right when the weather was wet, especially when they were trying to pass another car.

Subject to the above will be work to the value, normally, the £4,000 per annum to maintain the responsibility of the station master from the 1st July, or until re-arrangement. In this case the £4,000 will be paid to subject to the payment which has been previously delivered to the responsible for fitting the vehicle mount.

9125 Crane

The LCM8 carrying the Army 9125 crane to shore had no difficulty underway despite a pronounced list. The LCM8 grounded on an off-shore sandbar an hour before low tide. A LARC-V from the Naval Beach Group detachment assisted it in backing off. The LCM8 then waited for the tide to come in, and some 8 hr later made a second attempt. Again the LCM8 was stuck on a sandbar. This time cables were passed from bulldozers to the landing craft, with a hard strain on the lines the LCM8 was pulled over the bar and into the deeper water nearer the shore. From there it was successfully beached.

Bulldozers then graded a ramp for the crane to use in coming ashore. Momat was unrolled onto the graded ramp and, some 30 minutes after the LCM8 had been pulled across the sandbar, the crane was ready for moving ashore. In moving out of the LCM8 onto the mat, the crane got hung up on the after end of its carrier. By using an outrigger to jack itself up, the crane freed itself and moved onto the beach with no further difficulty. No difficulty was recorded in assembling the crane's counterweights, attaching the boom sections, and reeving the cables. These operations were accomplished during the night so that the crane was ready for operations before the first landing craft arrived the next day.

Sideloader

The LCU carrying the sideloader also had to be assisted by bulldozers in landing. It came ashore on the same tide as the LCM8 carrying the 9125 crane. After moving ashore out of the LCU, the sideloader overran the Momat matting and got stuck in the sand. Bulldozers assisted and got it back on the Momat. On another occasion it got stuck crossing a narrow gap between Momat strips. This time it used its outriggers to elevate its tires so that beach matting could be placed under them and then it was freed.

CONTAINER THROUGHPUT OPERATIONS

General

In the second phase of the pretest, which involved container throughput operations, the TCDP was used exclusively to discharge containers from hold and deck stowage locations aboard the TRANSCOLUMBIA to various types of lighters, including LCU, LCM8, LARC-XV, LARC-LX, BC barge, and causeway ferry.

Four methods were used to unload containers from lighters:

- 140-ton crane on jacked-up B DeLong to off-load all lighters and load containers on milvan chassis.
- 300-ton crane at the high waterline primarily to off-load LCU and LCM8 craft. It was used to also off-load amphibians and to transfer loaded containers onto milvan chassis.
- 140-ton crane in the marshalling area to unload amphibians.

- Frontloader to off-load containers from a causeway ferry onto milvan chassis.

These subsystem elements were not used concurrently due to the small quantity of test cargo available (20 milvans and 1 40-ft van). Nevertheless, the greatest was the first opportunity in 4 years that a container throughput exercise had been attempted. Data and training on the new Army equipment were needed. It was also the first time in 4 years that a container marshalling area operation was conducted and, although the activities there were relatively slow and simple, the same data and training opportunities existed. Documentation and movements management also played a part in this phase with some limited use of the mobile SPS van.

To be representative of military cargo shipped in containers, the containers were weighted with dummy cargo. Figure 8 shows the weight distribution of the containers used.

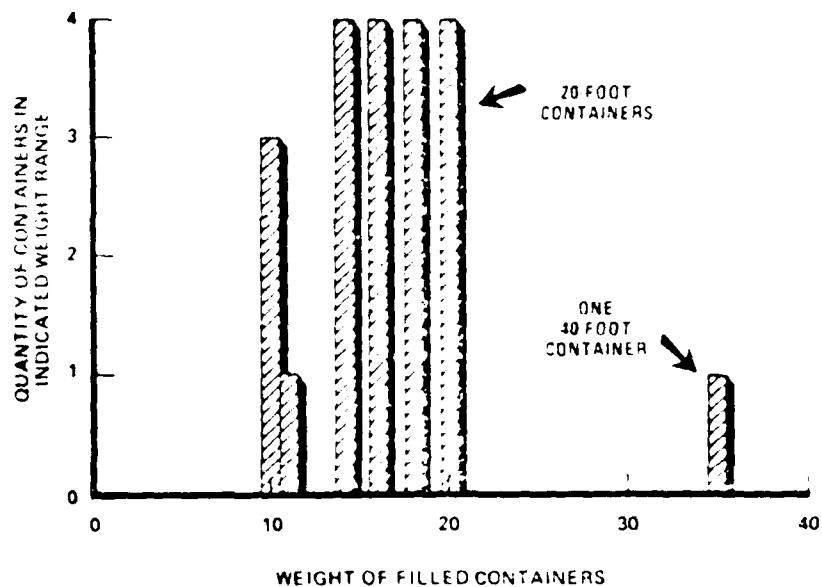


FIGURE 8. DISTRIBUTION OF CONTAINER WEIGHTS (20 and 40-FT)

Temporary Container Discharge Facility

Use of the heavy-lift breakbulk ship as a containership had two recognized drawbacks. First, there were no cell guides to assist in attachment of the container spreader bar to containers in the hold. As a result, stevedores had to wrestle the spreader bar around over the tops of containers until it could be engaged with the corner fittings. Second, the TCDF had to

take off water to clear the ship's booms and kingposts. Both of these data sets tended to allow cycle times. However, the fine data gathered provided a great deal of information useful for main test planning.

During the pretest the containers were first completely off-loaded from the ship and regraded. In some cases a container was backloaded and then without detaching the containers from the spreader bar the container was reloaded in the lighter. These latter iterations were disregarded since they had more training value than data validity. The TCBF working the TRANS-MBIA off-loaded 31 and backloaded 16 containers. When the ship charter period was completed, a LASH barge was used briefly instead. No timings were made at these loading and unloading events. There were considerable periods while working the ship in which the crane was inactive or delayed. When the ship was landed and was operating, a cycle required approximately 10 minutes. Obviously, backloading containers to the ship required approximately 7 minutes extra. Further discussion on these times is contained in Section III. Table 6 summarizes basic facilities of the TCBF.

TABLE 6
SUMMARY OF TCBF CHARACTERISTICS

Overall length (booms assembled)	130 ft
Width	60 ft
Gross weight*	656.2 LTons
Boom length	100 ft
Crane type used	Heavy duty
Weight of hook blocks (lb)	1,450 lb each
Hoist operation	Double drum
Wire	1 inch
Independent purchase	7 parts per hook
Rate of initial operation during test	15.4

* includes barge, crane, and crane foundations.

Crane at Water

Operations with the 600 crane at the water's edge commenced the afternoon of 1 November. The first day's activities consisted of discharging only five LCU's during a period of approximately 18 hr. Operations had commenced just 45 minutes after low tide, so it was not possible to land LCU's, LCVPs, or barges close enough for the crane to reach them. Therefore, to attain some crane use, amphibians were employed instead.

The next day, there was a morning high tide (0804) so retrograde operations were possible. One L1 was beached, backloaded with four containers, and retracted in 43 minutes. The average cycle time per container was 16 minutes 41 seconds. Poor weather was being experienced at the beach so the next L1 was loaded with only two containers before it was retracted after 22 minutes. After that, the F70C crane practiced loading and unloading LARC-EVs and trucks. Wind speeds up to 30 knots were experienced which caused difficulties for the crane handlers.

In the last try at beach operations for the 15-ton crane, approximately 1 hr after high tide, a LASH barge was grounded within the channel's reach and four containers were unloaded at an average rate of 8 1/4 minutes each. The barge was subsequently brought in at low tide and one container was off-loaded.

Operations on 22 Nov

The second major beach unloading system to be exercised was the 14-ton crane on the second pier. The Delong with the crane aboard was first sent to the site where it was successfully positioned at the beach using a Mac. Instillatrol barge. Subsequent working schedules normally followed a 1000-1000 routine since the Delong had no power.

The Delong was brought in approximately 1 hr before high tide and, approximately 45 minutes later all its caissons (piling) had been lowered. This was to facilitate the next day and the third day, November, after some initial set-up, the ramps to the Delong were lowered from the Delong to the pier. However, by the end of that day some additional alignment was required and the fourth day was spent aligning the ramps. Then, because a hole was created shoreread of the 4-ft high Delong ramps, an assault vehicle (AV1) bridge (AV1) ramp was installed. By the end of the day, after approximately 10 hrs of activity, spread over 4 days, the Delong pier was ready for operations. Appendix 3 provides a detailed description of the installation procedure and subsequent crane operations.

Operationally the Delong handled approximately 10 containers during the three days of trials. The first day of operations was mostly one of practice loading onto the landing craft and once onto a truck. The running of the next day, November, the hydraulic spreader was found damaged and a manual spreader had to be obtained. Consequently, the opportunity for operations during the high tide period was lost. During the low tide period initially some containers were established by loading and off-loading trucks. Then two LARC-EVs were sent with containers to the Delong and these were unloaded onto the pier, the contents were later retrograded via a LARC-EV.

The next day, 2 November, was more active. In the morning during high tide two L1's were loaded with three retrograde containers. Then three L1's and a L1 barge were loaded for off-loading a total of 10 containers. In the afternoon, landing crafts replaced landing craft in order that operations could continue during low tide. Two LARC-EVs were off-loaded and two others were back-laded.

On November 9, 1968, the first attempt was made to lift a container onto the causeway. Two Milvan trailers and two M-54 trucks were used to transport the container to the beach. At 0700 hours the 40 ft. high trailer was lifted onto the causeway. After the new ramp and lift cranes were delivered to the ship, the lift was attempted again, with improved results. Wind gusting to 10 knots was encountered during the attempt. They were the lightest conditions used in the attempt. Five attempts were made by various lift crews. The lift was terminated with two attempts and that was the extent of container activity for that day.

The last day, November 9, a LASH barge was moored at high tide to the beach and transported with four containers. At some point the LASH barge was damaged and required welding a plate over the hole. The welding was done at low tide with the barge moored and the hole exposed.

A CAUSEWAY TRAILER

The causeway ferry was used twice during the operation. The first time, November 11, a lifting in which containers were placed on milvan chassis directly on the ferry. The second employment a day later called for placing the trailer directly on the causeway. The four-section causeway used in both instances was guarded by two LCMF causeway tender boats.

On November the first operation was begun by loading three milvan trailers at the beach east of the Le Long pier. Bulldozers constructed a sand ramp to the causeway. As soon as the ramp was prepared, three M-54 trucks with the trailers individually proceeded onto the causeway. Each truck-trailer unit was positioned in a separate causeway section. The most seaward section, the one between the two tender boats, was left vacant. None of the vehicles were tied down. The causeway retracted from the beach without difficulty at 1 hr post high tide and proceeded towards the ship.

At 1400 the first milvan was lifted from the deck of the TCMF. After an hour of trying to position the container on the platform trailer, the attempt was aborted. The problems were:

- The relative motions of the TCMF and the causeway.
- The twist angle (approximately 4° degrees) needed to properly align the container with the trailer (see figure 8).
- The limited deck area for line holders.
- The target is small— even when there is no relative motion, as on dry land; it is not easy to position a container directly onto the container fittings of this type of trailer without repeated tries.

The second attempt on a different trailer was successful, requiring about 30 minutes. The first lift attempted had been to a trailer spotted on the causeway well forward of the TCMF crane. The second lift loaded a trailer which offered a better angle to the axis of the boom. (Dotted lines, figure 9.) The

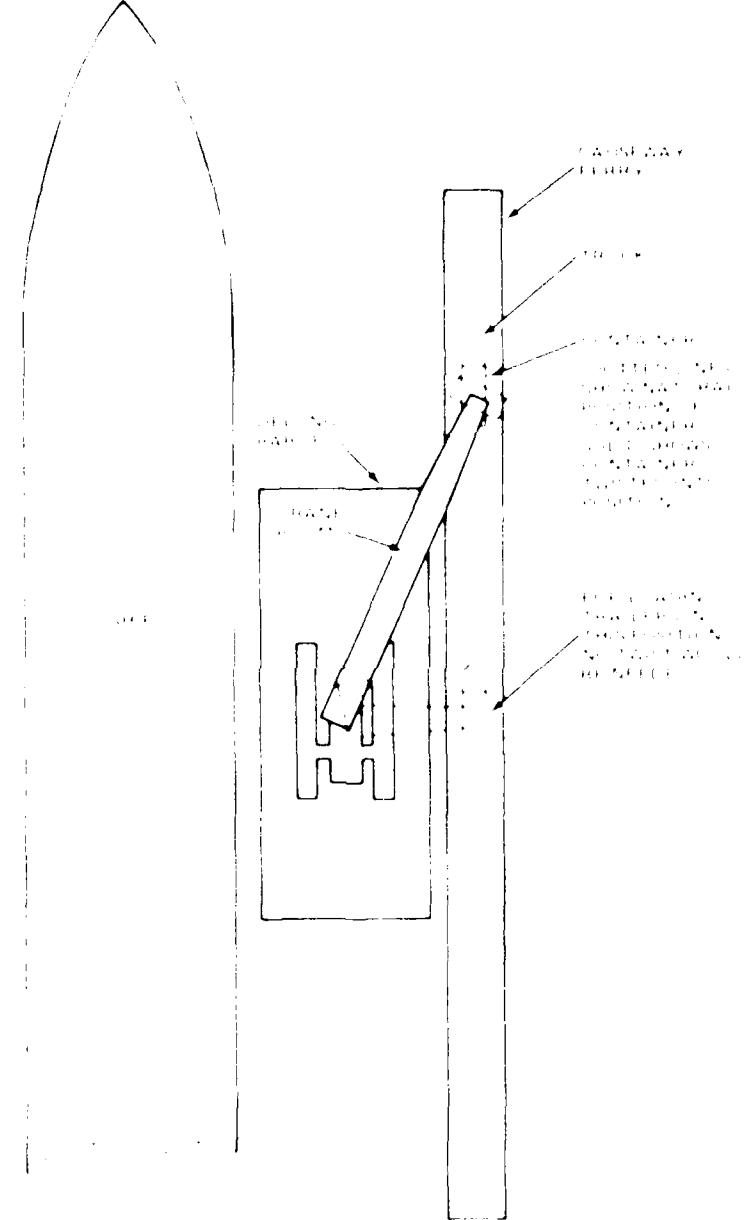


Fig. 1. Vertical magnetic core assembly for use in the magnetic separator.

time 0111 with the last vehicle on the beach at 0117 minutes. After 0117 there were waits of 10 minutes, 10 minutes, 10 minutes, about 10 minutes, but loading the two containers required nearly 1 hour. The final attempt to load the third container was again after about 10 minutes.

The causeway, once the vehicles had loaded, its approach 7½ hr after low tide required about 3 minutes to move the vehicles onto the beach required approximately 17 minutes.

In the other mode of causeway loading, five bulldozers were loaded from the ship directly onto the causeway. All had their landing axes across the causeway. The causeway is 20 ft wide and the container 12 ft long. There was some time lost in twisting the container 90 degrees to position them. The first section of causeway, the one that would beach first, was left vacant to provide a small working platform appropriate for beaching. The bulldozer was positioned in the second section of causeway in the third section. The fourth section was the last section. The causeway receded to the 14' level loaded with five bulldozers and one truck.

At the end, the causeway had difficulty moving perpendicular to the beach. Two bulldozers went out as far as 10 feet apart, but were initially unable to move. At this position, the tide was receding. After 1 hr on the causeway, the causeway receded at a 15-degree angle to the beach, but the bulldozers were able to push the causeway clear after about 3 minutes. It remained clear until 0117 minutes until within an hour of the water level at 14' when it was completely breached with the assistance of two bulldozers.

Once the causeway was secured by a bulldozer with the cable, the five vehicles were rapidly off-loaded by a frontloader directly to waiting trucks. This required approximately 15 minutes.

APPENDIX C - VAN USE

The mobile van, mobile data processing van, or interface van, interfaced with the mobile unit during test cycle 100, was employed for the second time in the 100th test cycle by the crew. The mobile van pretest, the mobile van interface, and the van required to furnish timely documentation essential to the subsequent availability of the van for transmitting the beach complement if it was not yet fully operational. Software for the supporting computer was still needed to support the test cycle, the rear monitors, the range talker, and frequency converter and Movement Components (TCMs) to the mobile unit. Also, the mobile van upper terminal equipment (TELA) [15] was not directly tied into the van in the communications link with the supporting computer. Sometimes, the operator provided a practical try-out of the available equipment and helped the van operator prepare before the main test.

Mobile van equipment which has been available on the mobile unit pretest cycle 100 is memory unit (11-17), a read/retry printer, a filing cabinet, and two decks. For the pretest, one deck was taken out and a key punch, a calculator, and another filing cabinet were added. Figure 10 shows the van's current interior layout.

1. Operational System

Teletype

2. Data

3. Output

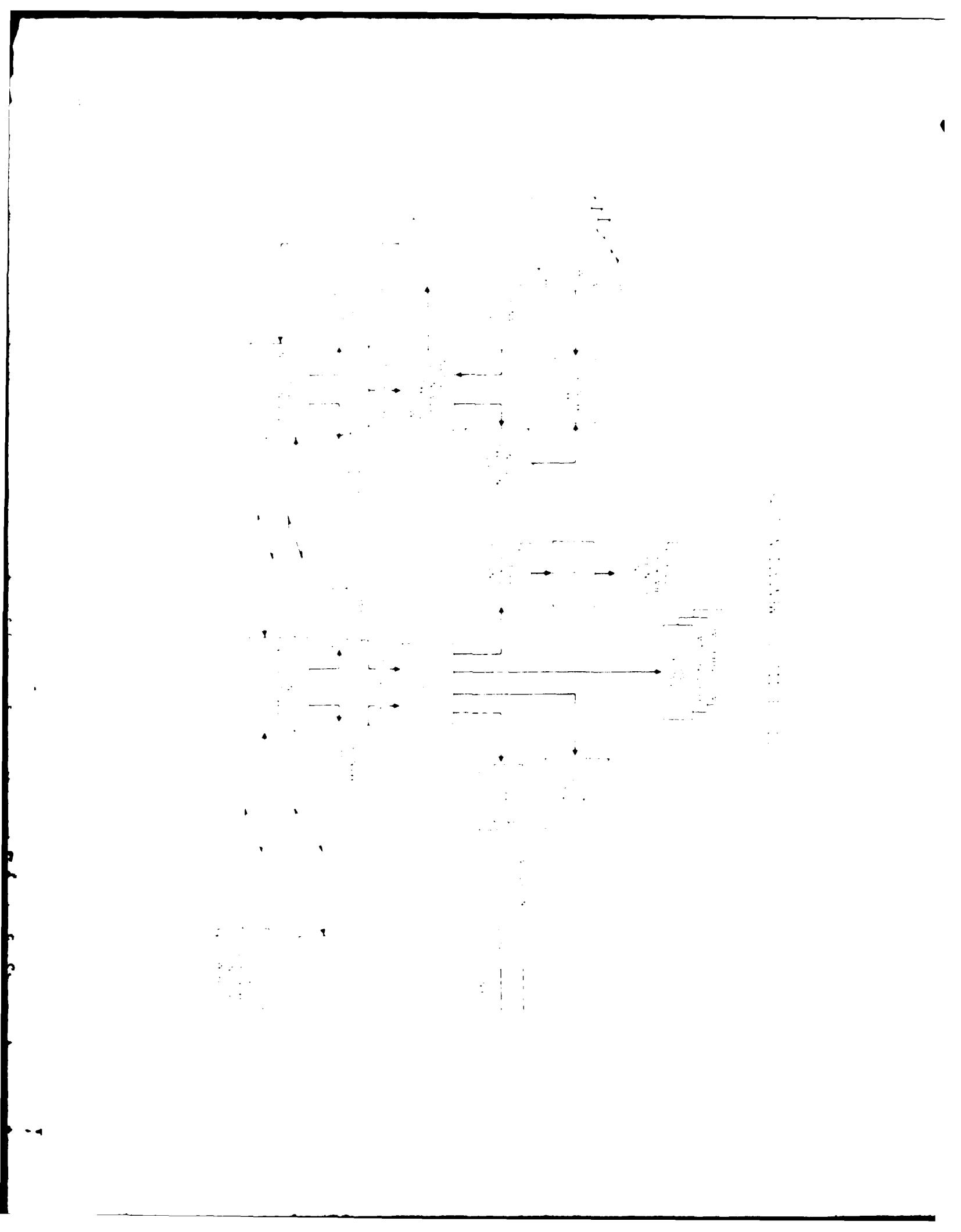
2.1. Operational System

During the development and receipt of operational data, the system was not played until it was ready, because initially unmarked cards were used to verify the system. Once the system was tested, the discharge billiers in the test area began to transmit bills for processing. With the installation of the readout equipment, it was possible to prepare cards that were stamped with the serial number, date, and report on charge-off status at the test site.

At the end of documentation, operational procedures were established for the test facility, which included billiers from several companies and the test area of the handling area. The documentation showed the operational procedures shown in Figure 11. As shown, the billiers were given a copy of the bill, a copy of the billability form, and a copy of the biller's identification card. The biller was also given a copy of the document to the biller's office and the other operational documents.

In the beginning, there was a two-week period of time called M-1 MARKET, which followed the start time in the test area. The M-1 MARKET provided automated reporting of billable items to the biller's office and the system.

- The first item of particular interest and importance is:
- Non-read of the billability of a vent item. In addition, if:
- Account is on the non-read side of the account, or empty, and either is required,



APPENDIX C

The pretest was used to verify the feasibility and practicability of employing the equipment of the present study set by the available ship types. The pretest showed that the present equipment can lighten the heavy, cumbersome load. The present load yet to be reduced include: landing barges, the LCM-1, the LCM-2, the LCM-3, the present's inflated LCM. This capability, however, is limited to the present's inflated LCM. This capability, however, is limited to the LCM-1, LCM-2, LCM-3 and three LCA(L) type. The present load of the LCM-1, LCM-2 and LCM-3. The pretest also verified that, except for the LCM-1, LCM-2 and LCM-3, the barges have the necessary clinging equipment so that the equipment can be released.

On 10 May 1968, the equipment of the STO was implemented smoothly. The first task of the equipment was to bring the beach and taking it back. This task was somewhat difficult because of the small waves, high gradient and the need to use mechanical and manpower. Nevertheless, the pretest confirmed that the equipment is necessary to fulfill the above tasks, especially, the task which is carried within the time planned to complete the mission, i.e., within 10 minutes. The permit time is indicated.

Nevertheless, it should be noted that this type of exercise will usually, necessarily, be different and partly faulty. In general, these were areas which training and experience are correct. For example, difficulties were experienced by drivers maneuvering the LCM and themselves over the beach and onto the landing, the landing zone, because, otherwise we not properly queued at the ship to prevent interruption of the mission. In fact, over the whole of activities, different frequencies and unpredictable.

The heavy stiff metal frame had a substantial amount of weight, and was not very strong. However, the frame could be strengthened by adding a horizontal cross brace at the top of the frame, or by adding a vertical support at the center of the frame. The frame was also very brittle, and tended to shatter if it was hit. The frame was also very difficult to assemble, and required a lot of time and effort. The frame was also very heavy, and required a lot of energy to move it around. The frame was also very difficult to disassemble, and required a lot of time and effort. The frame was also very difficult to clean, and required a lot of time and effort. The frame was also very difficult to store, and required a lot of space.

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Conclusion

In conclusion, the heavy stiff metal frame had a substantial amount of weight, and was not very strong. However, the frame could be strengthened by adding a horizontal cross brace at the top of the frame, or by adding a vertical support at the center of the frame. The frame was also very brittle, and tended to shatter if it was hit. The frame was also very difficult to assemble, and required a lot of time and effort. The frame was also very heavy, and required a lot of energy to move it around. The frame was also very difficult to disassemble, and required a lot of time and effort. The frame was also very difficult to clean, and required a lot of time and effort. The frame was also very difficult to store, and required a lot of space.

Future Work

In the future, the weight of the frame will be reduced by using lighter materials, such as aluminum or carbon fiber. The frame will also be made more flexible, so that it can be easily assembled and disassembled. The frame will also be made more durable, so that it can withstand more impact. The frame will also be made more compact, so that it can be stored more easily. The frame will also be made more efficient, so that it can be used more effectively. The frame will also be made more aesthetically pleasing, so that it can be used more effectively.

This position proved to be in error—the pins should have been at the other end. As the lift began the error became all too evident. The center of gravity of the crane assembly began to swing to a position under the suspension point, with the crane at a strong tilt. (See sketch, Figure 12.)

The tilt, however, was accommodated in the loading phase, although it did create some delay. While the ship was underway or prior to the initiation of ship unloading, the lifting frame should have been modified. The decision not to correct the location of the pins resulted in additional delays during off-loading operations.

Comparison of Crane Readiness Times for Different Assembly Configurations

The disassembly of the 300-ton capacity crane to a tactical configuration for deployment takes less time than an administrative (detailed) disassembly would for deployment on a ship with a less capable boom. This, of course, is also true for crane reassembly once the crane has been shipped to the objective area. Table 7 illustrates the differences in deployment times for the two disassembly operations. The table is based upon judgments regarding which delays are typical of real operations, which operations can be done concurrently, and the like.

In the test the 6250 crane was made ready from its minimum disassembly configuration in a shorter period than required when fully disassembled as in previous pretests. The turnaround of the crane on the beach makes a precise comparison of the times for the two get-ready operations difficult. Even after subtracting administrative delays, it is not possible to make an exact comparison.

The comparison shown in Table 7, then, should be interpreted as showing a general order of magnitude of difference in the times that could be expected between the two assembly operations, if two otherwise similar operations are compared. The table indicates what times were included and excluded in the comparison.

Looked at in total, the savings in time by moving the crane in its minimum disassembly configuration is about 2 days. This difference depends on the assumptions made. These assumptions concern such matters as:

- Whether the loading bottleneck will be the heavy crane (in effect, Table 7 does assume this);
- The order of unloading from the ship (the components for the 9175 and 6250 cranes are assumed to have priority for unloading); and
- Whether the assembly of the 9175 crane could be done concurrently with the discharge of the 6250 crane components from the ship (as assumed in Table 7).

POSITION OF CRANE WITH CORRECT
SUSPENSION POINT. CENTER OF GRAVITY
IS DIRECTLY BELOW SHIP'S HOOK



POSITION OF CRANE WITH INCORRECT
SUSPENSION POINT. CENTER OF GRAVITY
IN DIRECTLY BELOW SHIP'S HOOK

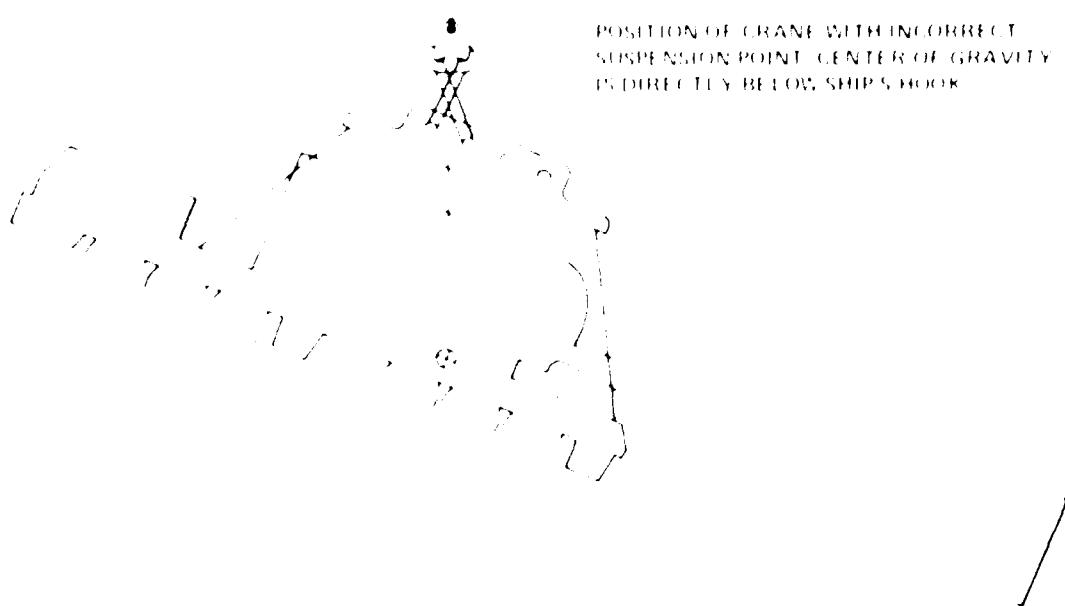


FIGURE 1.1. Schematic showing crane tilt
which resulted from incorrect selection of holes
in top member of hoist rig.
(Not to scale.)

TABLE I
MOVEMENT TIMES FOR DEPLOYING HEAVY CRANE

Administrative, Disassembled 6250 (as in previous pretest)	Minimum Disassembly (as in Heavy-Lift Ship pretest)
Disassembly and Loading Times	
Disassembly and mobile loading (as reported in 411-13) 4.0 hr	Partial disassembly and mobile loading of booms and counterweights 11 hr
Transit time to port of departure	Transit time
Assembly times - counterweight, upper boom, lower boom, struts, jacks 2.0 hr	Single heavy lift 1.0 hr
Assembly times - counterweights, boom, etc 1.0 hr	Counterweights, booms, etc 3.0 hr
	Off-loading Times (at objective area)
Off-loading assembled crane 1.0 hr	Off-loading assembled crane 1.0 hr
Transfer 1.0 hr	
CPT 1.0 hr	
Minutes total off-loading 3.0 hr	
	Movement to Shore
Transit time to last port then transit time with counterweight assembled 1.0 hr	Ship-to-shore transit time 1.0 hr
Transfer time at shoreline, time to the last port then two-wheel trailer movement with counterweight 1.0 hr	Transfer time 1.0 hr
	Assembly Times (based on best estimates)
Reassemble 9125 crane 1.0 hr	Install operator's module 1 hr
Reassemble 6250 crane 2.0 hr	Assemble booms and counter- weights 3 hr
Total time 34.0 hr	4 hr
	Difference attributable to degree of disassembly 5.8 hr

Even if the assumptions listed are not realized in a contingency and the listed components of the deployment times are different from those shown in the table, it is argued that there would still be a definite advantage. This advantage would be in the order of two days if the more fully assembled crane configuration is possible for deployment. This advantage is gained by the use of a heavy-lift ship that can load and discharge the crane (tactically disassembled) and the type lighter needed to transport the 6250 crane (in its more nearly operational configuration) to shore.

The decision on which configuration to use in moving the 6250 crane will be dictated by the shipping available. Assuming that in a future emergency heavy-lift ships will have other cargo competing for sea transport, a comparison like that shown above would be of value in making a decision on shipping allocation. In either case, supply shipments must be delayed until an appropriate window of availability has been established in the objective area.

In addition to the allocation considerations are the lesser risks in the movement of the heavier, fully assembled crane versus the risks of reassembling it after it has been detail-stripped. Detail stripping is necessary to permit the crane being carried on a ship that can load and off-load components weighing only 15 long tons or less. The detailed disassembly and reassembly requires the need for more highly skilled and experienced personnel and still leaves the risk of not being able to assemble these fitting components that may have been damaged in transit.

Moving Cranes Ashore from Ship

Transit of the cranes from the ship to the vicinity of the beach aboard their respective lighters, the LCT and the LCM, presented no problem, but landing close to the beach presented real difficulties at low tide and was difficult even at high tide. Thus, the sandbars were a considerably delaying factor, particularly in the operations at Green Beach, Ft. Story. For the assault craftmen amphibians are, of course, an answer to sandbars and the best patient crafters. However, during the deployment phase and ship-to-shore movement, even the largest amphibious vehicle (the LARC-L) is not capable of lifting either crane. In any case, these vehicles are in short supply, and are themselves difficult to deploy. Thus, for deployment with landing craft, beach gradient and sandbar problems appear to need further study, if the lightest of the potential problems they present to equipment deployment, especially LCM equipment.

Deployment of Equipment

The use of the heavy-lift ship to deploy 14ft-class LCUs was reaffirmed as a tried and proven procedure during the pretest. However, the Navy's new 1646-class LCUs which had been scheduled for loading was not because neither the ship nor the Navy had the necessary sling. As part of the charter agreement the ship is required to carry other LCU slings but no requirement has been levied for carrying a sling needed for this type landing craft. Since this is the predominant LCU in the Navy and the older Army LCUs will be phased out in favor of craft similar to the Navy's, this shortcoming should be rectified.

From the point of view of the best use of the heavy-lift ship as a resource with severe limitations on the total quantities of equipment it can carry, its LCU capability is still most important. MC has 16 ships that can carry LCUs, causeway sections, and, potentially, BL barges, but it has only these two ships that can carry four LCU's each. An LCU is necessary for carrying a fully-assembled crane and it has a greater container lightering capacity than is relatively uninhibited in improved beach operations. It also has capabilities to operate longer in heavy weather than other types of landing craft.

CAUSEWAY FERRY - REASSESSMENT

The causeway ferry was the only non-amphibian lighter in the pretest that was able to function at any desired stage of the tide and could cross sandbars that hindered other landing craft. The reason for this is the shallow draft of the causeway, particularly its shoreward end when left unloaded. The shallow draft permits a safe approach to the beach and its light weight forward permits the shore end to be pushed up on the sand toward dry land. The section at the shore end is, thus, literally a causeway leading out to the cargo-carrying sections of the ferry, which remain in deeper water. The total length of the four-section ferry used was 160 ft, although additional sections can be added increasing the length.

The operation in which the causeway was loaded with containers placed with their frames athwartship, was in the overall more efficient than the iteration in which the containers were placed on silvan chassis. This was because much greater accuracy was required to land the containers on the silvan chassis, which proved to be difficult and time consuming.

In the operation without trailers the containers were placed directly on the causeway. One possible disadvantage is that loaded in this manner there is a greater chance the containers are likely to get wet in other than a calm sea. Also, the containers had to be positioned athwartship for unloading by a frontloader on the beach. This required tailine handlers to turn the suspended container 90 degrees or more. This was accomplished, however, without great difficulty. Since the containers are 10 ft long and the causeway is 21 ft wide, there is little room along the edge of the causeway for tailine handlers to maneuver the swaying containers.

For unloading the ferry on shore the frontloader was very effective, since only one unit was slow since the same frontloader was also used to position each container on a trailer. The five containers were unloaded in just over 1 hr, or approximately 6 minutes each. If two front loaders had been available this time could have been greatly reduced. An empty trailer could move onto the causeway immediately after its predecessor left with a load. Another way to reduce the causeway unloading time, at the expense of some double handling and possible truck delay, would be to have the single frontloader drop each container at a point near the causeway until it was unloaded, then the frontloader would load trailers until another loaded causeway ferry was beached.

The causeway ferry provides a beaching capability where landing craft are not able to function. Its use should be considered by the JIC in its lighterage mix during periods of the main test when landing craft are unable to beach.

1. ANALYSIS OF THE TESTS AND RESULTS

The purpose of the TTS project is to provide military personnel with the information required to evaluate the results of the test. In addition, the results of the test will be used to determine the effectiveness of the test methods used in planning the test, the expected results of the test, and the reliability of the TTS as a test and evaluation method. The results of the TTS are also used to determine the best methods of testing.

The analysis of the TTS results is based on the results of the tests conducted by the TTS project. The results of the tests were analyzed to determine the effectiveness of the test methods used, the reliability of the test results, and the expected results of the test. The results of the tests were also used to determine the reliability of the TTS as a test and evaluation method. The results of the tests were also used to determine the best methods of testing.

1.1. ANALYSIS OF THE TESTS AND RESULTS

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the two sets of lines, the natural and artificial. The two sets were suspended from the same point, so as to run parallel to each other, and to have the same tension. The two sets of lines were suspended from the same point, so as to run parallel to each other, and to have the same tension. The two sets of lines were suspended from the same point, so as to run parallel to each other, and to have the same tension.

The way to minimize the effect of the unbalance is to use a balanced beam. The unbalance is due to the difference between the center of gravity and the required center of balance. This will be most evident when loading a ship from one side to another at the same time, such as at the same harbor, where it may be required to move the center of gravity from one side to the other. In this case, the ship would be balanced by shifting the center of gravity to the side which would be watered after weight on the other.

REFERENCES

The present invention relates to a magnetic separator that can separate magnetic material from non-magnetic material without the use of a magnet. The magnetic separator shown in the drawings has a barge magnet parallel to the conveyor belt, with a gap therebetween. The barge and the ship at the gap of the magnet were to be moved forward to attract particles from a further distance. The gap between the barge was not required to have in the present invention, the following, presumably, interference with the magnetic properties, now that it will be evident in the magnetic separator that by now the barge has the ability of the magnets to attract non-magnetic material, and in the case of the barge, to move it in front of the magnets, so that it can attract the magnetic material from the barge. A system of this kind, it may be suggested, can be used to

W. C. G. T. G. T. G. T.

With the form of welds and vessel characteristics it is known that the amount of heat input and porosity of the base metal are the main factors influencing the quality of the preparation. Therefore, the quality of the joints may be determined by the following methods: 1) by the quality of the joints made during one of the original welding operations; 2) by comparison with the original joints, the quality of which is known.

1. *What is the best way to approach a difficult conversation?*

The first two sections of the paper are concerned with the development of the theory of the λ -calculus, and the third section is concerned with the application of the theory to the study of the foundations of mathematics.

After the first two days of the meeting, the group was divided into two subgroups, one for each of the two main topics.

For example, a person who has been exposed to a disease may not immediately become ill. This period of time between exposure and illness is called the incubation period.

and the first time I have ever been in contact with the people of the country. I am very much interested in the people here, and I hope to make some money to help them.

The constant, though small, increase in the amount of smoke in the atmosphere is due to the steadily increasing number of motor vehicles and the gradual increase in the use of the internal combustion engine.

The development of the α - β transition is currently measured by a three-axis differential thermal analysis technique. The heating and cooling phases, as well as the two reference curves, are measured simultaneously in the same instrument. The following sections describe these methods.

In the test the two 1955 Brooklands cars and one 1956 were fitted with the new front wheel.

the first time in the history of the world, the people of the United States have been called upon to make a choice between two opposite ways of life, between two different philosophies of government.

The one way of life is based upon the principles of freedom, equality, and democracy; the other is based upon the principles of despotism, inequality, and专制。

The people of the United States have chosen the way of life based upon the principles of freedom, equality, and democracy.

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the first time in the history of the world, the people of the United States have been compelled to make a choice between two political parties, each of which has a distinct and well-defined platform, and each of which has a definite and well-defined object in view. The people of the United States have been compelled to make a choice between two political parties, each of which has a distinct and well-defined platform, and each of which has a definite and well-defined object in view. The people of the United States have been compelled to make a choice between two political parties, each of which has a distinct and well-defined platform, and each of which has a definite and well-defined object in view. The people of the United States have been compelled to make a choice between two political parties, each of which has a distinct and well-defined platform, and each of which has a definite and well-defined object in view.

A-3

TABLE A.
EXPERIMENTAL DATA

	Experiments
Maximum deflection	1.00 mm.
Deflection at center	0.40 mm.
Deflection at end	0.20 mm.
Deflection at quarter point	0.10 mm.
Deflection at one-third point	0.05 mm.

	Deflection	Deflection	Deflection	Deflection	Deflection
Deflection at center	0.40 mm.				
Deflection at end	0.20 mm.				
Deflection at quarter point	0.10 mm.				
Deflection at one-third point	0.05 mm.				

Maximum deflection at center = 1.00 mm.

Maximum deflection at end = 0.20 mm.

Maximum deflection at quarter point = 0.10 mm.

Maximum deflection at one-third point = 0.05 mm.

THE BOSTONIAN

• 100% 電子化申請，減少紙面申請，降低申請時間。

REFERENCES AND NOTES

The following statement will settle the balance due on account of the
above.

A rough calculation shows that the average fruit was 1.1 ft.

FIGURE 8.1. A DELONG PLATE EXPOSED TO THE BEACH



After a day with no activity (November 2), work began on positioning the ramps. Galvanized steel plating, mounted on rail-ties, was positioned in front of the barge on the beach to act as a foundation for the beach end of the ramp when the ramp had been winched off the barge. Concurrently, a metal lip at the shore edge of the barge was burned off with an acetylene torch to facilitate off-loading the ramp. Holes were cut in the ramps for cable hooks so that each ramp could be winched off with two bulldozers.

During the operation one bulldozer winched a little faster than the other, causing some misalignment of the first ramp. As a result, the cable hole on the right side was distorted and the line came loose. A new hook-up was made, alignment was re-establishe and the ramp was winched off the barge without further misalignment. The ramp was pulled to a position with one end on the beach and the other still overhanging the barge platform by approximately 1½ ft.

The beach area was again graded and the beach end foundation timbers were realigned. The second ramp was winched off the barge. Alignment with the left ramp was assisted by an additional bulldozer. The winching this time took only 3 minutes. Lessons learned in the first ramp were evident during the winching operation on the second.

Next the left end was raised further on its supports to allow a better angle for the ramp to the pier support beams. The supports, or ledges, are located on the vertical face of the barge end. They are at a sufficient distance below the barge deck that when the ramp is in place, its toe is flush with the barge deck.

The five-ton crane then lifted the barge end of the left ramp. At the same time two bulldozers began pulling the beach end of the ramp until the barge end was clear of the barge platform. The crane then lowered the ramp onto the support ledge. The ramp was then secured. This operation took only 3 minutes each for both ramps. An additional bulldozer was used to push the right ramp against the left. When both ramps were in place, the right side at the beach end was approximately 1 ft higher than the left. This was the situation when activities ceased at the end of the working day.

The next morning, November 4, two 10-ton cranes attempted to lift the beach end of the left ramp in order to shore it up to the height of the right end. The weight of the ramp was estimated at 15 tons. By lifting only one end, the total lift was only about 1½ tons. Two attempts to lift the ramp were unsuccessful until the 10-ton cranes were secured. However, two bulldozers, working in unison, were able to lift the end of the ramp. Shoring was installed and a proper horizontal alignment achieved.

When both ramps were properly positioned and secured to the pier, a landing was constructed by two bulldozers. Immediately thereafter, an Assault Vehicle Landing Bridge (AVLB) positioned its scissored landing bridge over the sand ramp to the pier ramps. No problems were encountered with the AVLB. Total time for the AVLB operation was 4 minutes.

A final beach grading was completed at 1600 and the pier was ready for operations. Total elapsed working time for the ramp emplacement was

Each of these 1000 samples was weighed, the specimen being weighed, the tare and the weight of the container were then subtracted.

- 1000 mg. of carbon black
- 1000 mg. of talc
- 1000 mg. of kaolin
- 1000 mg. of bentonite
- 1000 mg. of attapulgite
- 1000 mg. of dolomite
- 1000 mg. of lime
- 1000 mg. of gypsum
- 1000 mg. of magnesite
- 1000 mg. of dolomitic limestone
- 1000 mg. of dolomitic magnesite

It is to be noted that in general terms the difference in the density of the different materials used in the specimens was not great enough to allow the use of a balance scale. The fact that the error was decreased by the use of a balance scale is due to the potential for greater precision and smaller error due to the use of a balance scale over the ordinary weight scale which is subject to the effects of gravity and temperature.

The samples of each material were weighed in triplicate. In general this was done to obtain a more accurate average value. In some cases where the material was very light or very heavy the average of two samples was taken. This was done to reduce the chance of error due to the use of a balance scale.

After the samples had been weighed the total weight of all the samples was determined. The total weight of the samples was then divided by the number of samples to obtain the average weight per sample. This value was then used to calculate the percentage error of the average weight per sample.

RESULTS AND DISCUSSION

The results of the analysis of each of the 1000 samples are given in Table I. It can be seen from the data in the table that the average percentage error of the 1000 samples was 1.0%. The 1000 samples were transferred to the empty 1000 mg. containers in the same sequence as originally used. The transfer of the samples to the empty containers was done in such a manner that the samples did not come in contact with the inner walls of the containers.

the first time, however, it was not until the second time that the two were able to get away from the others. When they got away from the others, they went to the top of the hill where they had been. They were there for about half an hour. They had been there before, but this time they had been there longer. They were there because they wanted to go home.

The next day, the two were still at the top of the hill. They were still there because they wanted to go home. They were still there because they wanted to go home.

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1100 operations were suspended during a lunch break between 1145 and 1330, during this time the 10 ft. gap in the pier was repaired. Two milvans were on the pier waiting to be transported to the marshalling area. These milvans were ultimately lowered into the water and transported to the pier approximately 4 hr after being offloaded from the barge.

After a break the day consisted of two loaded LASH docking and disengaging the milvans. At 1400 two additional milvans were then loaded onto these LASH and after which all operations were secured.

Early the next day, 1 November, the ALE scissor lift was removed. Three scissor lifts of the same rating were substituted, together with Monat for the monowheel. In the early morning time seas were rough with wave heights estimated at 10 ft with winds up to 22 knots.

The day began as planned at the pier but because of the surf conditions it was decided to wait until 1000. The craft would ground out whenever it made contact with the pier so unsuccessful attempts to lift the milvan out of the pier resulted in damage and operations were postponed.

At 1000 the first attempt to lift the milvan off the pier was made. The monowheel was used to support the 10 ft. segment. Operations were called off at 1030 due to the onset of high wind and seas.

At 1100 the second attempt was made. Two milvans were rapidly loaded onto a LASH barge. The monowheel was again substituted on the pier before the barge moored at 1130. Approximately 1 hr later the barge was loaded, two LASHes arrived. One was loaded with one container and the other was empty. The container was moved between the two craft three times. Average cycle time was 5 minutes.

At 1200 the day was suspended during the lunch break. At 1400 a LASH barge arrived at the pier to perform welding repairs. The repairs continued throughout the evening. At 1500 a 12 ft. x 1 ft plate was welded over a hole inflicted above the water line. This operation took up one whole side of the pier and restricted the movement of the other side.

At 1600 the remainder of the day four LASH-LVs were loaded with containers. There were no apparent difficulties.

APPENDIX C
TEMPORARY CONTAINERSHIP DISCHARGE FACILITY (TCDF)

GENERAL

The Heavy-Lift Breakbulk Ship Pretest helped provide data on crane capabilities and limitations in the important area of Temporary Containership Discharge Facility (TCDF) operations. This pretest was the first opportunity to use the Army's own 6250 (300-ton lifting capacity) crane on a floating Barge barge for the discharge of containers from the holds of a ship. In addition, it was the first time military operators were used to conduct TCDF-containership operations. Although there were some artificialities due to the lack of container cell guides, the need to top the crane boom to clear the bridge beams and kingposts, and the limited opportunity for establishing a rhythmic lifting, valuable data and insights were gained.

SAFETY

As of this report, it is uncertain what capacity load can be safely lifted by a mobile crane mounted on a floating platform when the crane (and platform) moves in response to waves or to the load. That is, when waves are moving the platform, different kinds of stresses occur in the crane from those experienced on solid ground. Accordingly, the crane lift capability is reduced to allow for such extra or different stresses; in other words, the crane must be rated for operations in a seaway. It is possible that the point may be reached where the crane on the barge cannot safely hoist the heaviest loads. In that case, in attempting a lift there is the possibility of a catastrophic failure to some component of the crane.

The second part of the trial test was conducted primarily to determine the maximum load that could be handled by the crane. The test was designed to simulate actual load and operating conditions that would be encountered during the actual lifting of the bridge. The results of the test were as follows:

and the effect of different positions in which containers were attached to the truck. In addition, the steering tests of the off crane in the first column of table 1 show that during the container unloading, the truck was not able to turn around the components of the crane arm were part of the truck. This agrees with the effects of platform rotation caused by the movement of the truck or the crane. Results from the driving program in table 1 show that the effect of different types of turns in the first column of table 1 is not significant. The results of the steering tests in table 1 show that the results of the measurements of the steering have been affected by the truck driver's memory test. It seems that the only effect of the use of this data and its analysis will appear in the third column of table 1, where the difficulties to unload certain components

the first time, the author has been able to determine the exact date of the original manuscript.

19. The following is a list of associations that have been formed by the members of the community.

There were four different ways of doing this. The first was to have the operator take a picture of the entire test strip, and then have the operator take another picture of the same strip after it had been processed. The second way was to have the operator take a picture of the test strip before it was processed, and then have the operator take another picture of the same strip after it had been processed. The third way was to have the operator take a picture of the test strip before it was processed, and then have the operator take another picture of the same strip after it had been processed. The fourth way was to have the operator take a picture of the test strip before it was processed, and then have the operator take another picture of the same strip after it had been processed.

• 23 •

and the author's name, and the date of the letter, and the name of the library or organization that holds the letter.

the first time in the history of the world, the people of the United States have been compelled to make a choice between two political parties, each of which has a distinct and well-defined platform, and each of which has a definite and well-defined object in view.

Figure 11 illustrates the clearances and reach dimensions that occurred during the protest in which the heavy-lift ship was acting as a substitute for a containership. A reach to the centerline of the ship is necessary to remove hatch covers on many containerships. The designers of containerships, in general, hold to the rule that a hatch cover can be no heavier than the heaviest container to be lifted from the holds of that ship. This limits the maximum hatch requirement to a maximum of 10,000 lb or the equivalent weight of a standard 40-ft container and that of a spreader bar needed to lift it. In ships with only 20-ft containers, hatch covers weigh considerably less but a spreader bar capable of accommodating the maximum requirement.

The heavy-lift ship has a beam of 110 ft. Half of this distance, the reach to the ship's centerline, added to the center between the barge and the ship and the half-beam of the barge produced a nine reach requirement of 110 ft center-to-center for the hatch of the heavy-lift breakbulk ship. This distance is also illustrated in Figure 11. It may be noted from Table 11 that, under the current protest statute for this distance, a hatch cover of 10,000 lb would be required if the hatch could be lifted. In fact, there is a "surplus" of 10,000 lb of hatch cover. Under current statute law, this is approximately the limit and maximum of the reach requirement for the type ship chartered by the plaintiff to the carrier, and unless there are false seas and a relatively light spreader bar, it is unlikely to occur.

In wider containerships (not have beams of approximately 95 ft), the reach would have to be greater. Even if a suitable tonnage wide ship were available to the centerline, the reach would have to be at least 110 ft. However, under current statutory limits the crane would not be able to lift a 10,000-lb hatch cover. For ships designed for 20-ft containers with a beam of 110 ft, 110 ft reach would be within the limits of the iterated statute.

IV. THE ADDITIONAL REACH REQUIREMENT

The heavy-lift protest by the plaintiff was conducted using a lift truck rather than the crane. The lift truck is, of course, the more difficult weight and the capacity of the vessel must be reduced. However, there are circumstances that would allow a protest to the use of a lift truck. The first is to be able to demonstrate that the lift truck requirements, ship stability, and freedom

from collision requirements of the lift truck used in the protest will, generally, not affect the ship. These concerns from hatches directly, generally, relate to the safety, especially, with respect to those containers near the centerline. They are probably true if reach only to the centerline of the containership will accommodate frequent repositioning in order to place the lift truck far enough from the centerline within the barge's lifting range.

It is not clear whether the protest was successful. The heavy-lift containership, containership-type chartered to the plaintiff, which had been 110 ft off the center of gravity for the hatch, was 100 ft off the ship's centerline. Therefore, the reach will be 110 ft or well within the 110 ft protest statute one again.

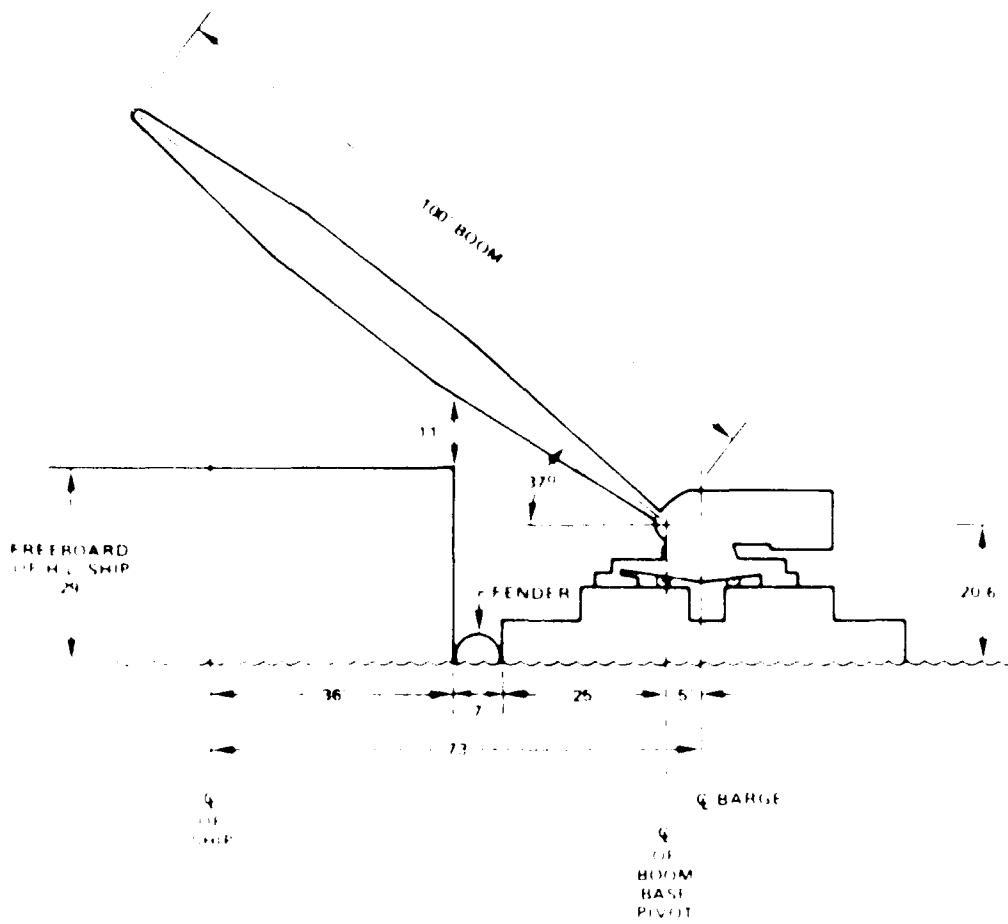


FIGURE 6.1 - CLEARANCE AND REACH DIMENSIONS FOR 100' BOOM TO REACH
THE FENDER WITH CONTAINERS IN POSITION DURING HEAVY-LIFT SHIP PRETEST.

A longer reach could also be beneficial in helping ship stability. This would result when the TCOF is capable of reaching across the ship's centerline to lift all containers. Thus, with only one TCOF on site working this would help the ship maintain a more even keel during the unloading process than if the containers were first removed from one side and then the other.

Another factor to be considered is the freeboard of the ship. For a ship partnership with a freeboard greater than the heavy-lift breakbulk ship, a longer boom would be required. This is illustrated in Figure 6.1.

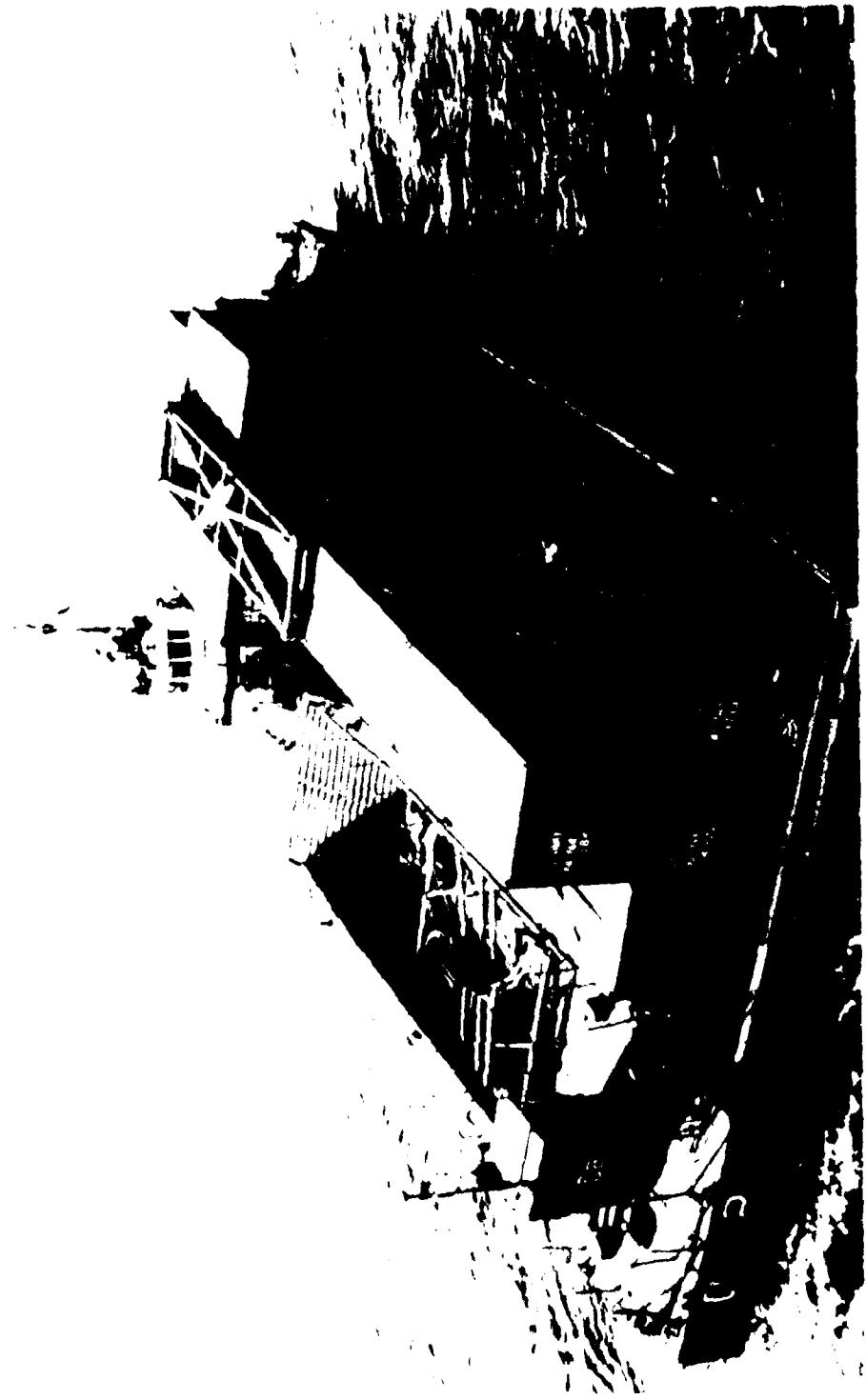
With the range of weights and vessel characteristics now known, some preliminary planning for the configuration and operation of the lift crane on the heavy-lift vessel type can be done.

APPENDIX I

APPENDIX I: APPENDIX TO THE A.Y. 1977-78 PRACTICAL WORKSHEET

1956 TRANSCO MEMBER CHARTER. The original charter, one of two heavy-duty breakaway
charters entered into by the first charterer, was signed on January 21, 1956, for the
primary purpose of operating under a long-term charter to the Missouri River
Harbor, principally for the benefit of its shareholders.





High-contrast photograph of a large vessel, possibly a ship or a building, partially submerged in water. The vessel has a prominent white hull section and a dark superstructure. The background is very bright, creating a strong silhouette effect. The image appears to be a negative or a heavily processed photograph.



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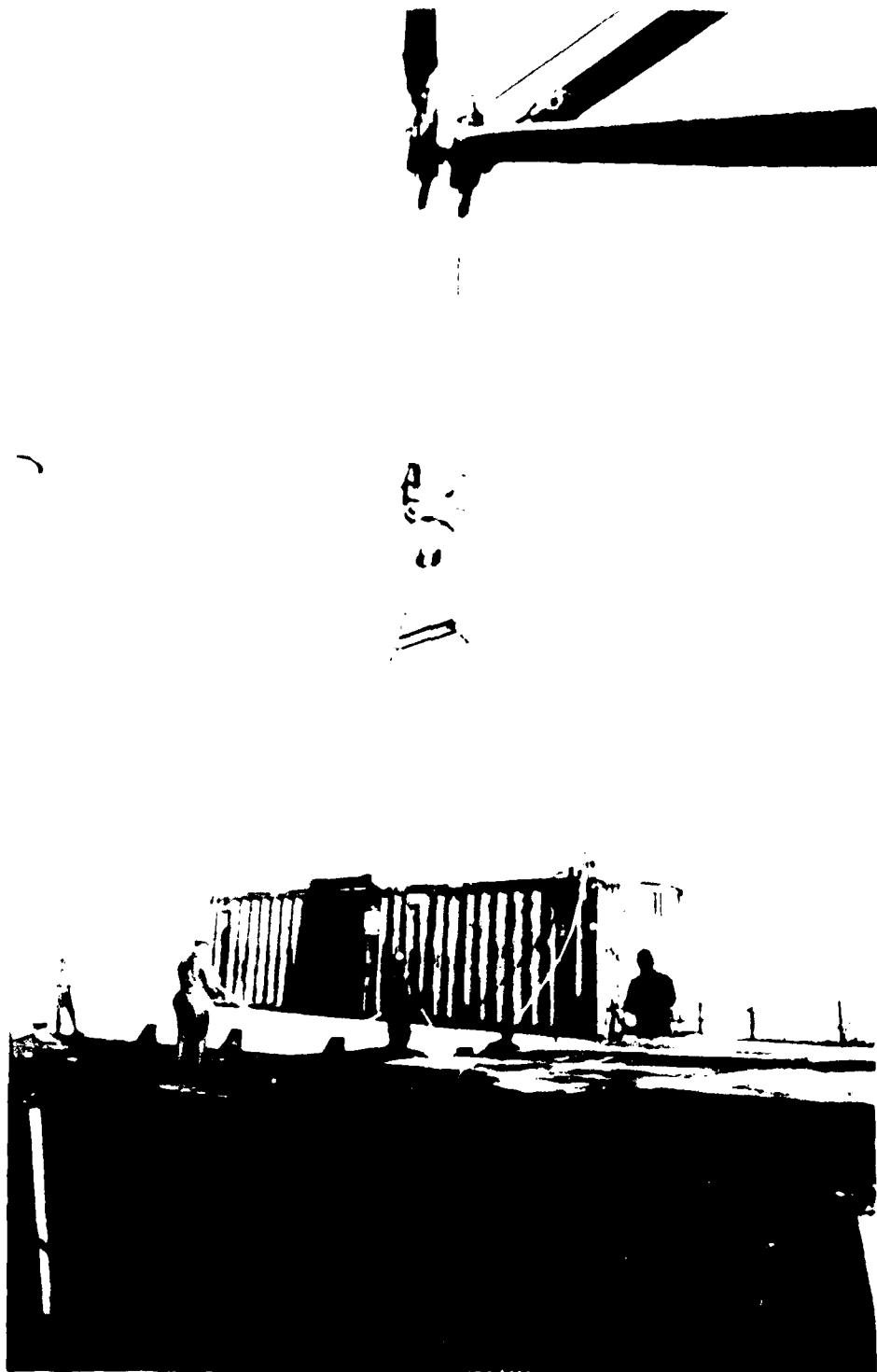


FIGURE 3.4. 40-FT CONTAINER. One 40-ft container was included in the load to provide data and experience in handling a 40-ft container which weighed 14,700 lbs.

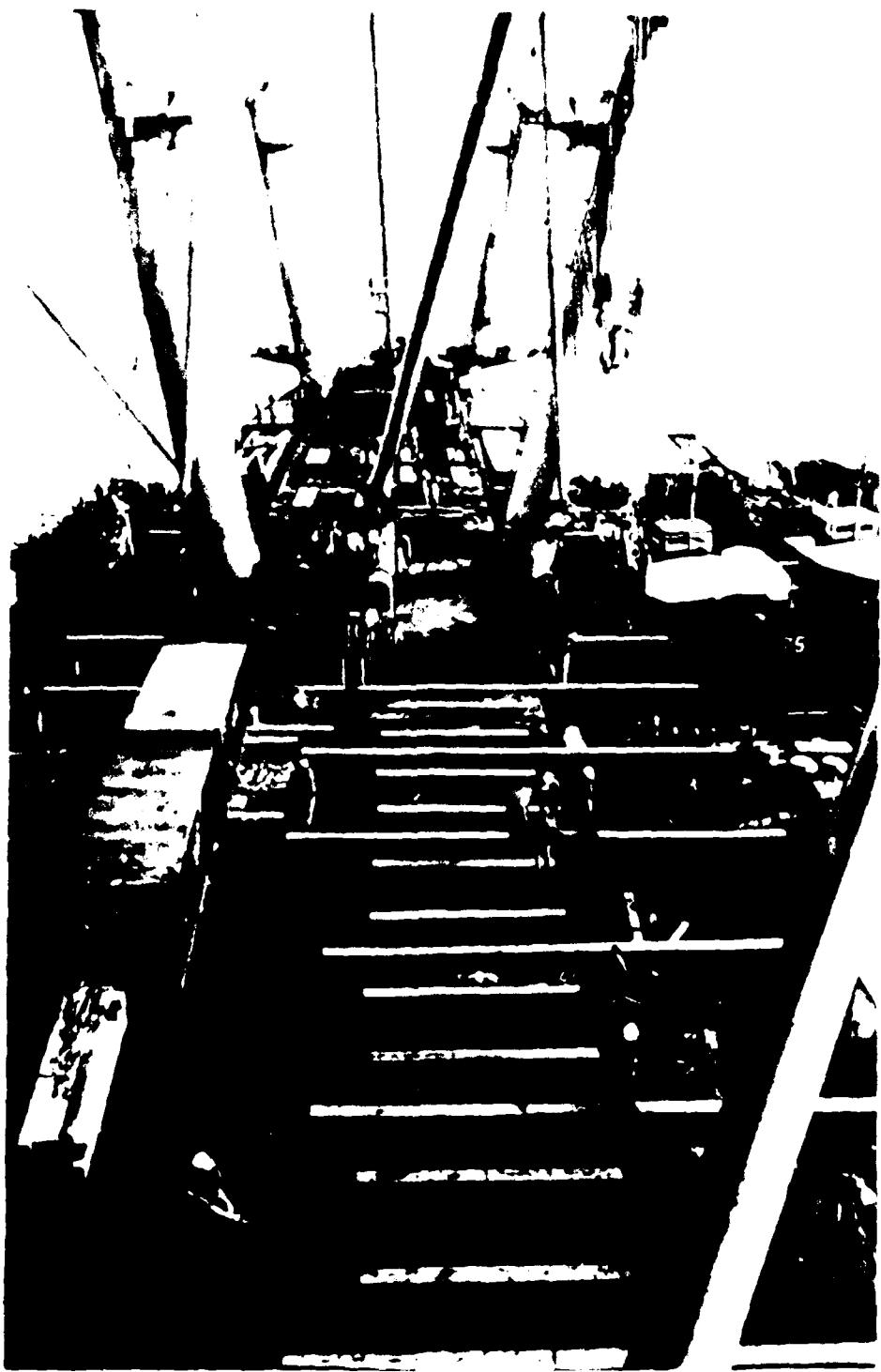


FIGURE 1.5. DECK PREPARED. Punnage was laid on deck in preparation for the heaviest lift made in the LST pretest program, a 14tf-class Army LC. Each of the two heavy-lift ships (the only heavy-lift ships currently in the U.S. flag fleet) can carry four of these large landing craft. A 164t-class LST could not be lifted because neither the ship nor the Navy had the necessary sling.



FIGURE 2-6. BOOM MARRIAGE. To lift the 180-ton LCU, a boom marriage of two 120-ton capacity booms was made. This gives the ship a 240-ton lifting capability, although reportedly the ship has lifted and carried a 250-ton LCU.

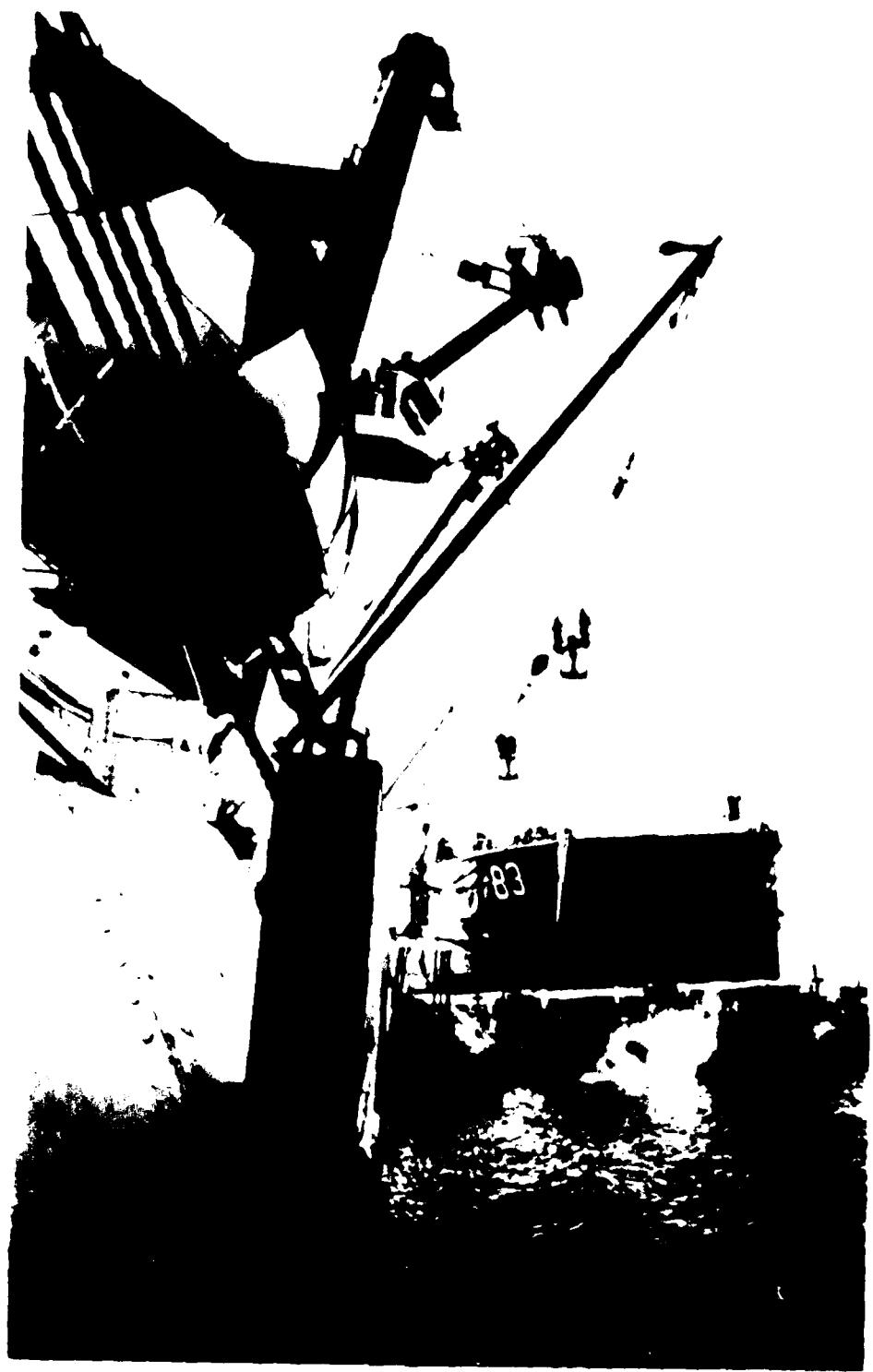


FIGURE 11. LIFTED WITH EASE. The LCU lift, although infrequently accomplished, was made with relative ease. Military personnel acted as stevedores but the ship's company operated all machinery and directed the technical aspects of the lift.

FIGURE 1. An LST listing 10 degrees during the LCI lift. The ship did experience nearly an 18-degree list, however, the ship was designed to take a maximum 12-degree list during loading. A counterweight system operated to limit the heavy lists.



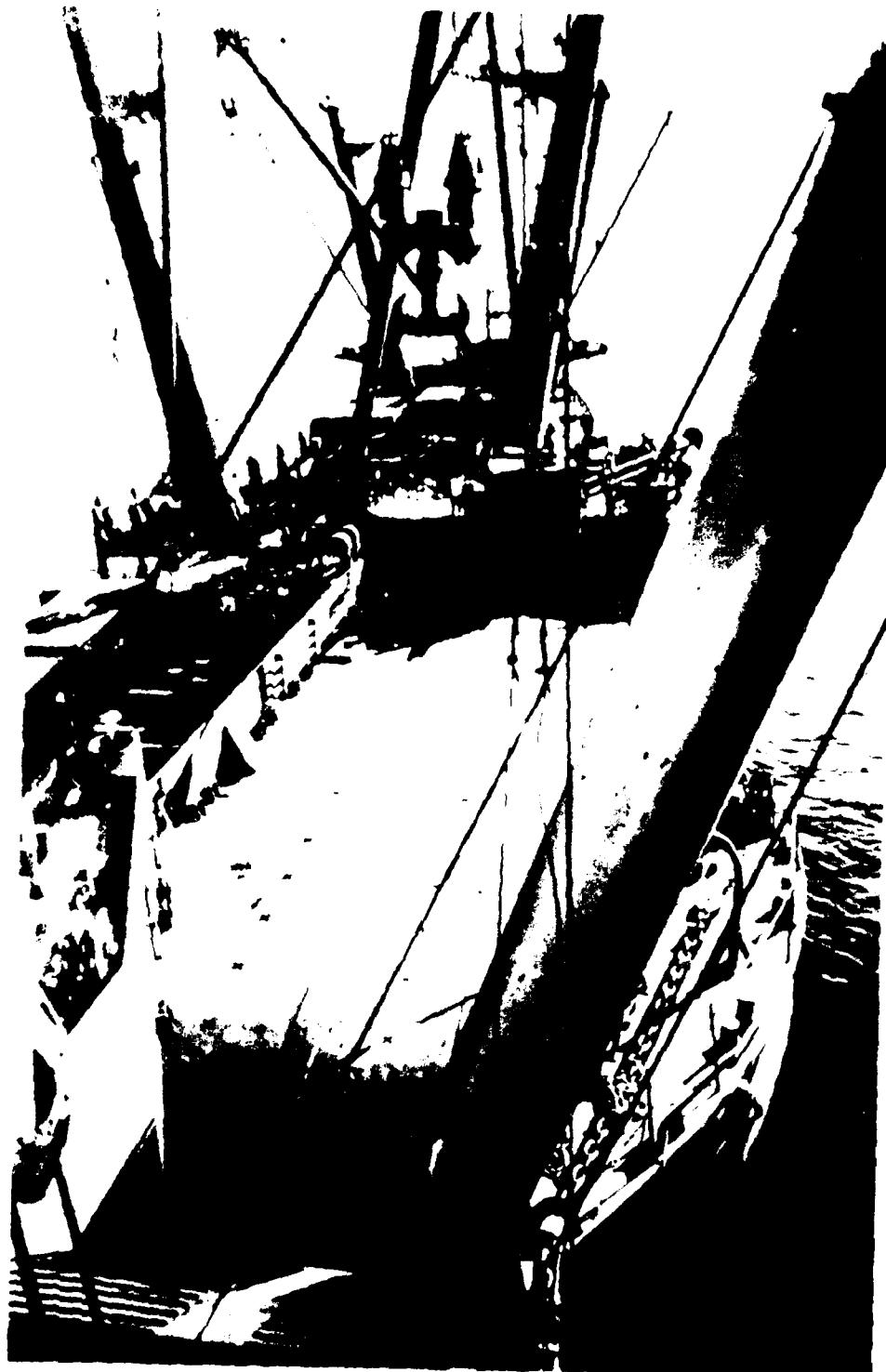
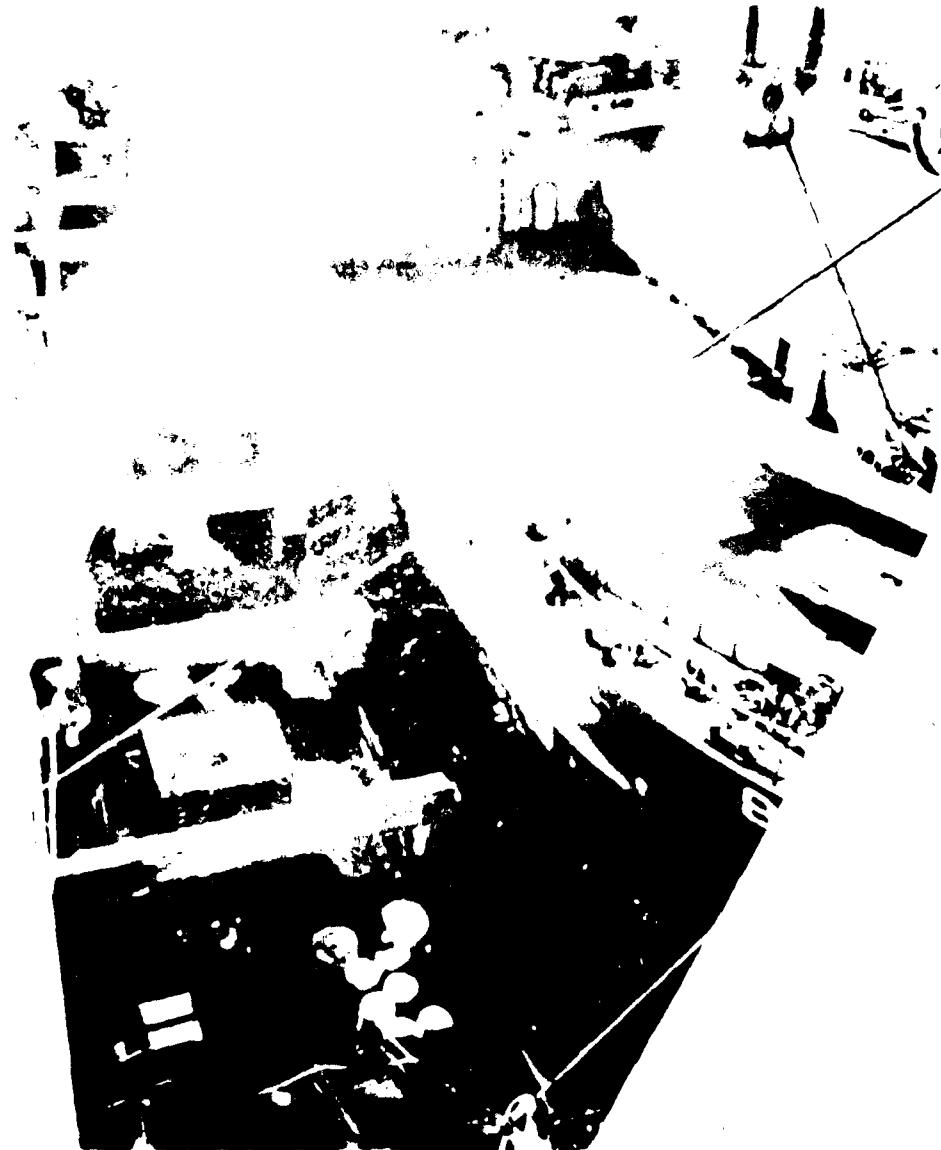


FIGURE 3. NO SPECIAL PREPARATIONS REQUIRED. No special preparations are required to secure the LCT for lifting. In this case the LCT's mast was lowered to the water by tentacles, but this proved to be unnecessary.



1. 2. 3. 4. 5. 6. 7. 8. 9. 10.



FIGURE 1. A GROUP GATHERING. The Assembly of the First Baptist Church of the City of Atlanta, Georgia, at their meeting room, January, due to a lack of space in their former building, an earlier佛教僧徒 had to be seated outside. This was a Lenten breakfast they were having. The new building is planned to be completed in time for the Lenten services.

1
The following photographs were made at different times during the year 1900, illustrating conditions of life among the Indians.



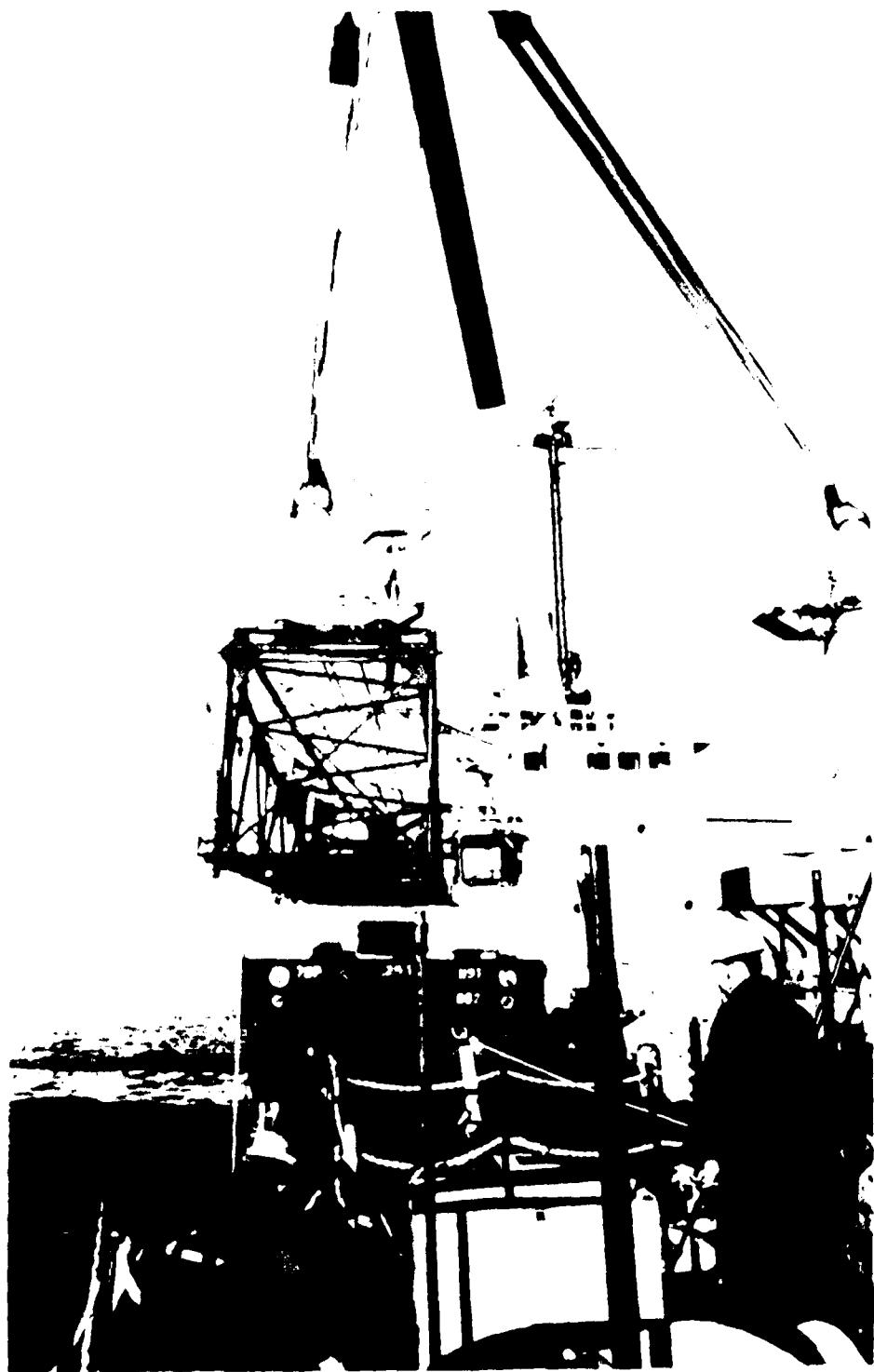


Fig. 40. - A 10-ton capacity lattice boom crane lifting the 14-ft. by 14-ft. by 100-ft. long steel girder used in the construction of the new bridge over the Mississippi River at Davenport, Iowa.

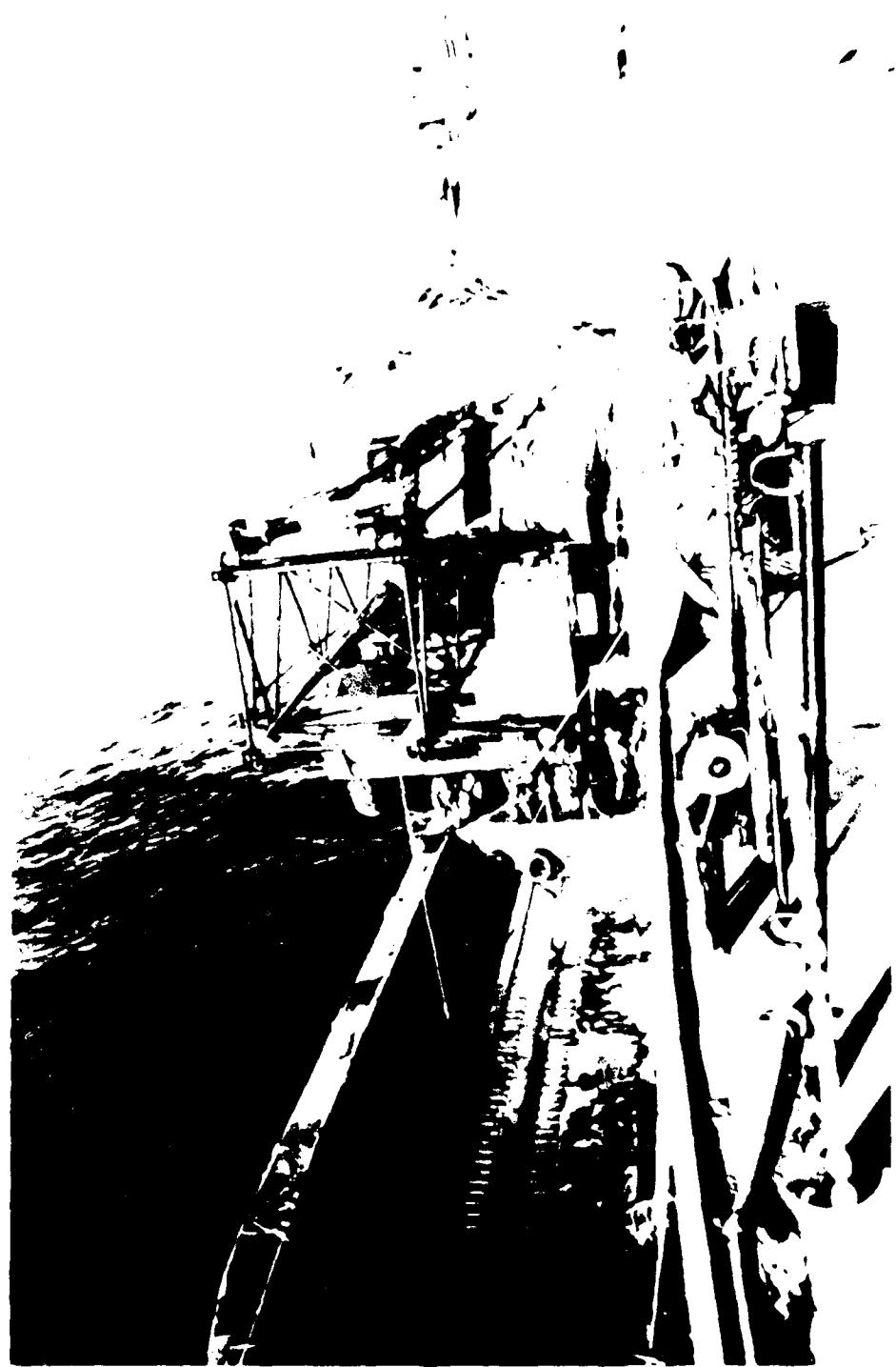
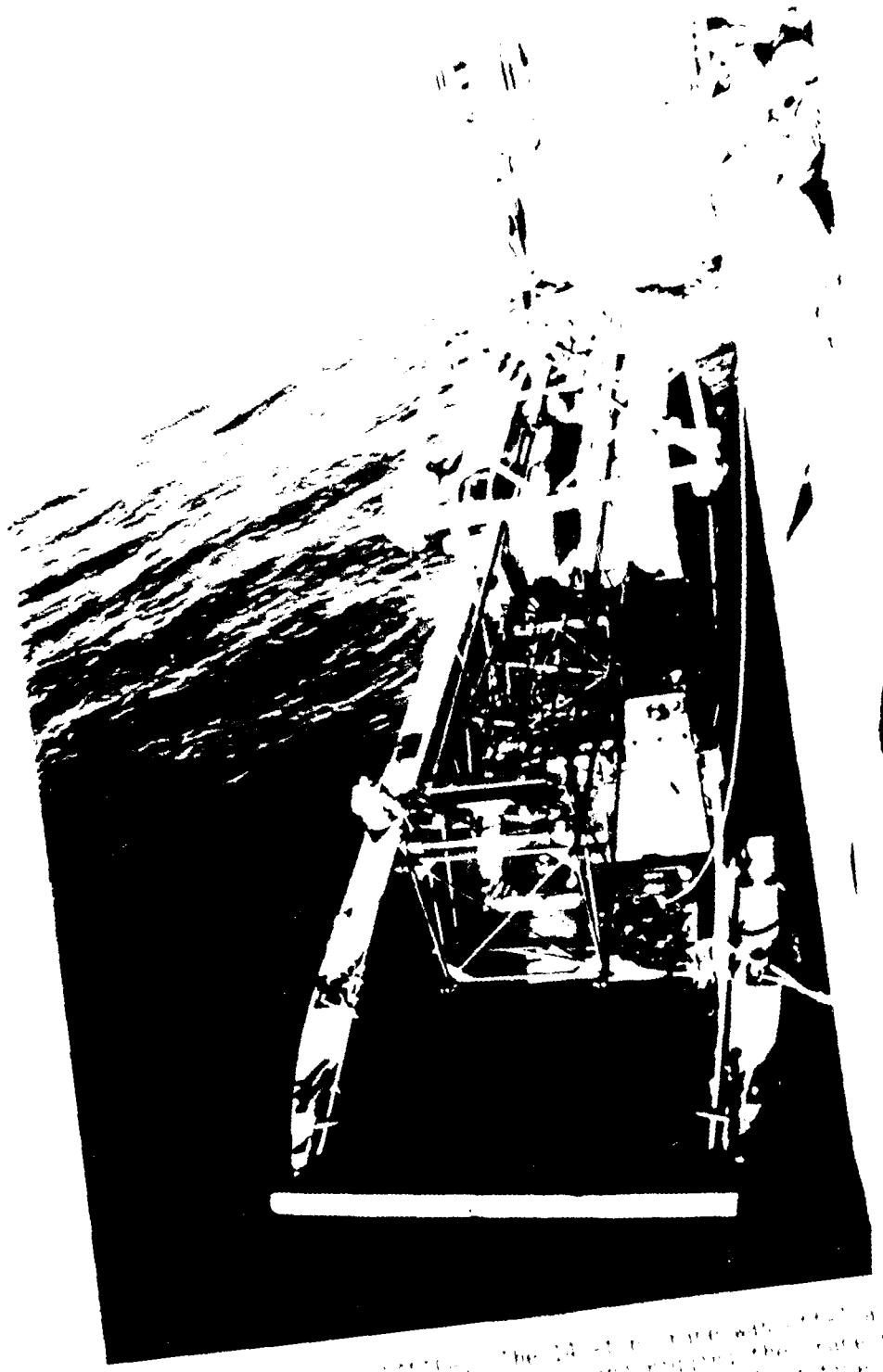
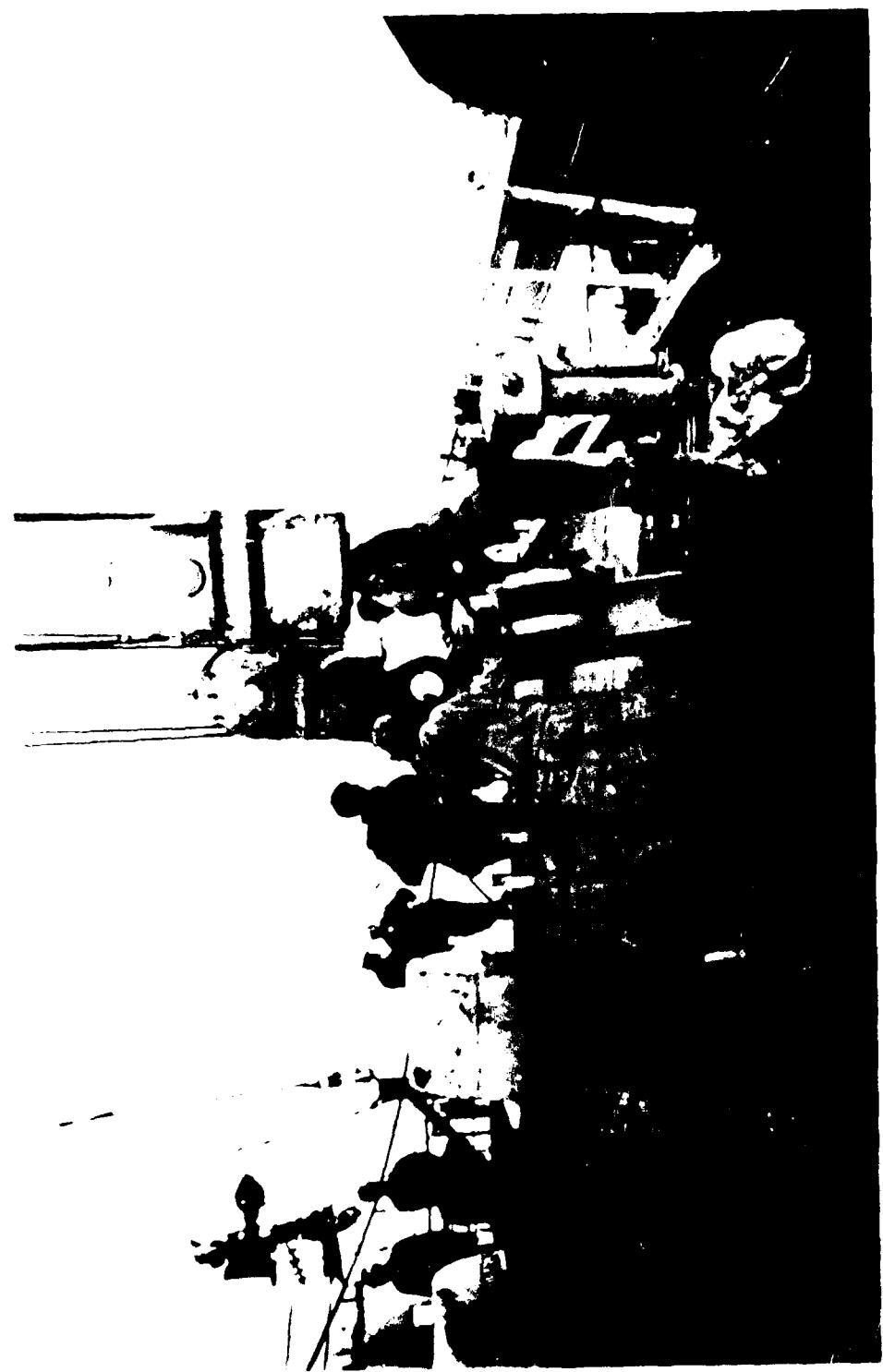


Figure 107. Because it had not been possible to find the original manuscript, everything treatable has been put together in this volume. It is the best that can be done with the available material.



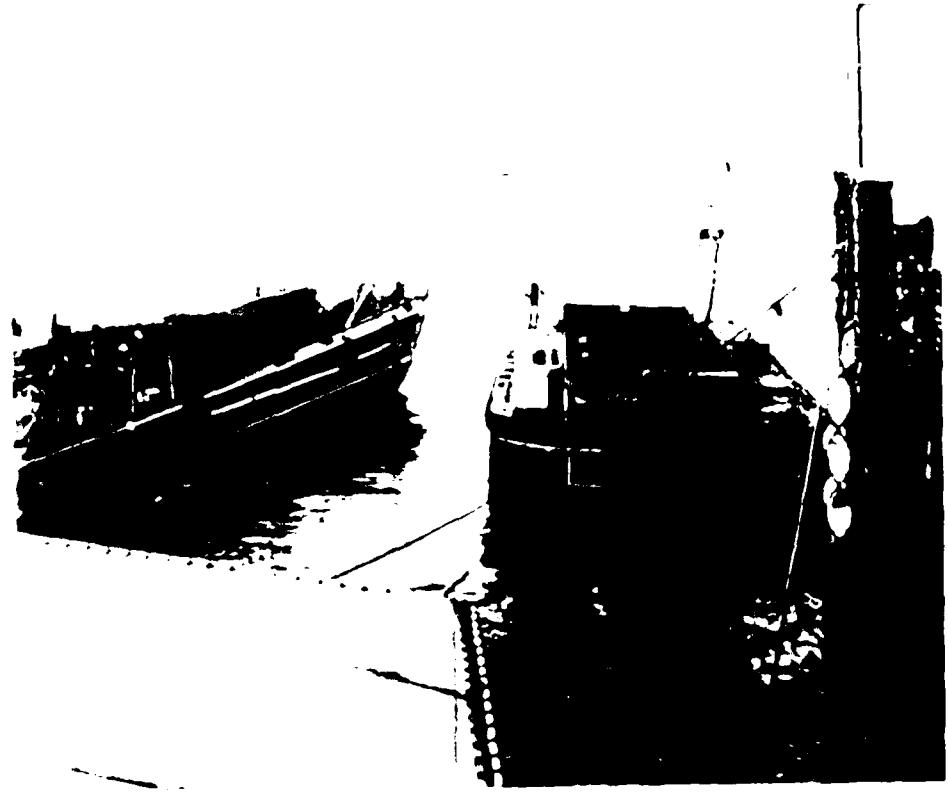
1000 ft. above the water bottom. The 14-15' tide with waves about 10' high, was still rising when we started the survey. The current generated by most of the waves were very strong. The survey along the bottom, was after a short time of about 10 minutes, stopped because of the strong currents. After a short time of about 10 minutes, the current had subsided enough to allow us to continue the survey. When the current became too strong again, we stopped the survey. This continued until the end of the survey.



1. The first stage of the process is the identification of the problem. This involves defining the problem clearly and precisely, identifying its causes, and determining its scope and impact. It requires a thorough analysis of the situation, including the collection of relevant data and information, and the identification of key stakeholders and their interests. This stage is crucial for ensuring that the solution developed is appropriate and effective for the specific problem at hand.



This photograph was taken to provide a better perspective on the subject. The above view provides a perspective of the exterior rear entrance which is located at the rear of the building. This is a minor clearance.



1948 FORD CARGO TRUCK FOR TOWING. THE 14' LONG TRAILER UNIT WHICH
WILL BE USED FOR TOWING AND HAS A HEIGHT OF 17' 6" AND A WIDTH OF 7' 6". IT CAN BE
TOWED AND INTERNALLY SHOWN ONLY BY A HEAVY DUTY TOWED JACK.



The boat, a M/V TERRAPIN, was hoisted onto the larger vessel, the
M/V LADY OF THE SEAS.

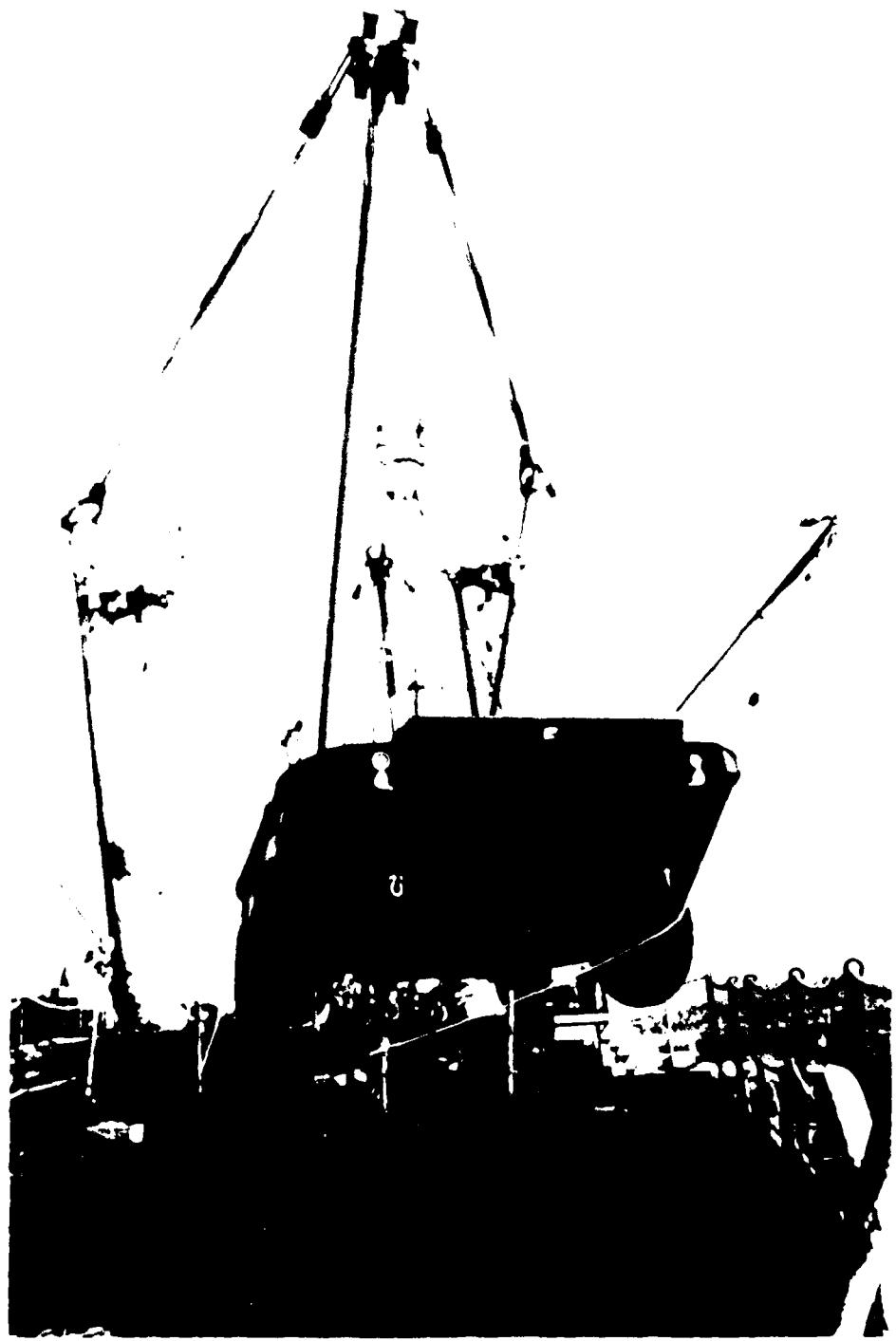
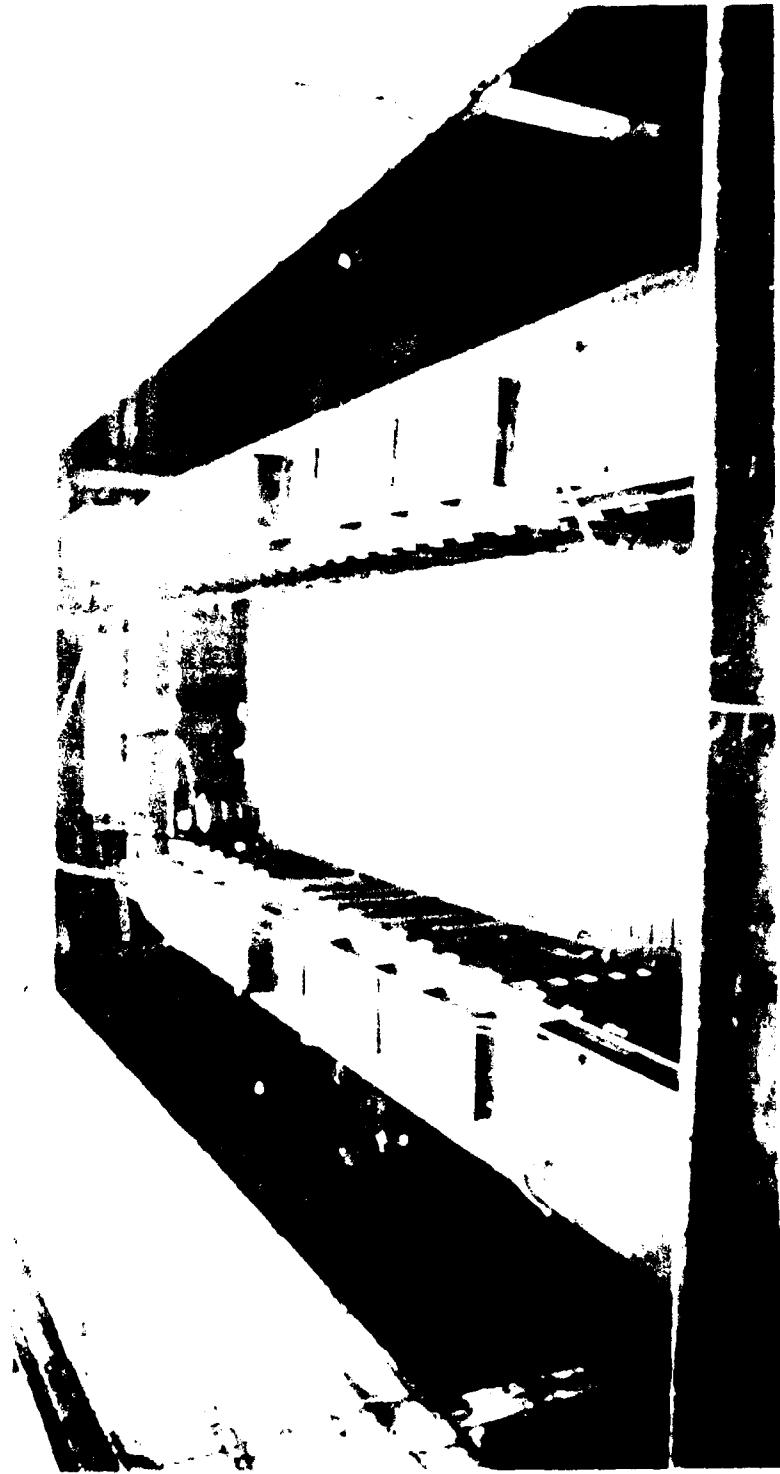


FIGURE 1. OVERHEAD CLEARANCE PROBLEMS. The overhead clearance problems were experienced by the Captain when swiveling the 17' 10" high AAC-L3 across the deck and over the rail.



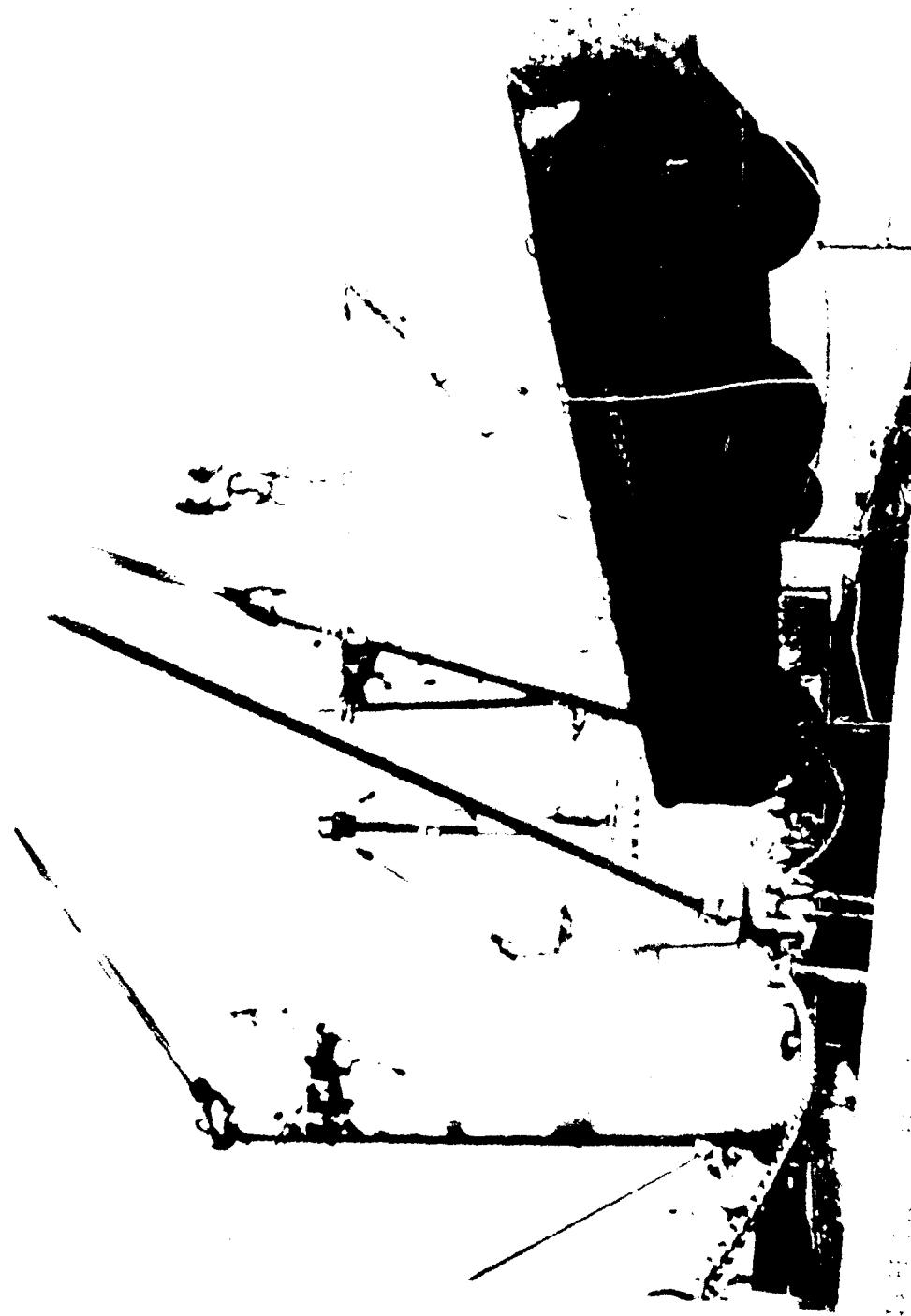
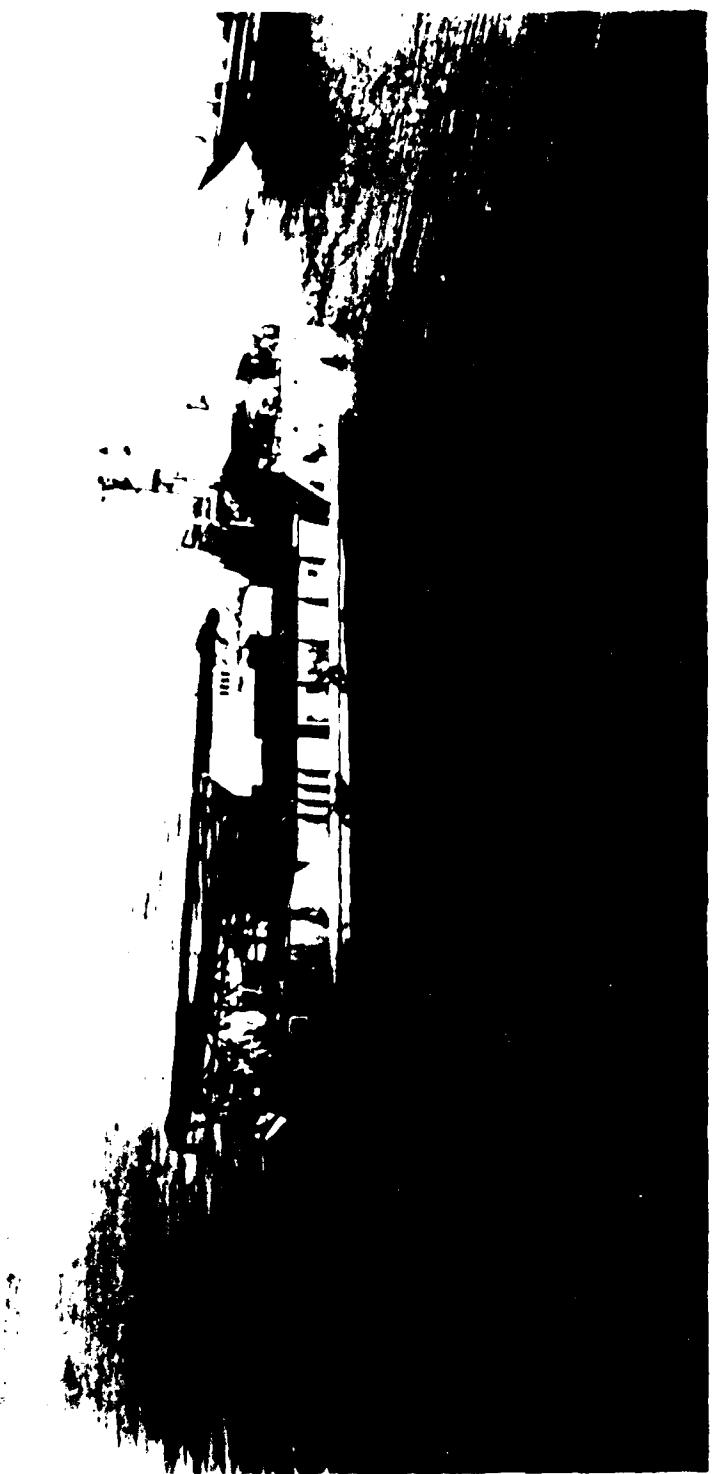


Fig. 1. A photograph of the same individual as in Fig. 2, taken from a different angle. The subject is seated in a boat, and the camera is positioned at a higher level than in Fig. 2. The image is very high contrast, making details difficult to discern.



FIGURE 1. A photograph taken at 0100 hr, approximately one-third of the 46-minute duration of the experiment. Note the 10' height of the amphibious vehicle and the 10' height of the water surface.



1. The first step is to identify the specific type of wood being used. This can be done by examining the grain, texture, and color of the wood. Some common types of wood used in furniture making include oak, maple, cherry, and mahogany.

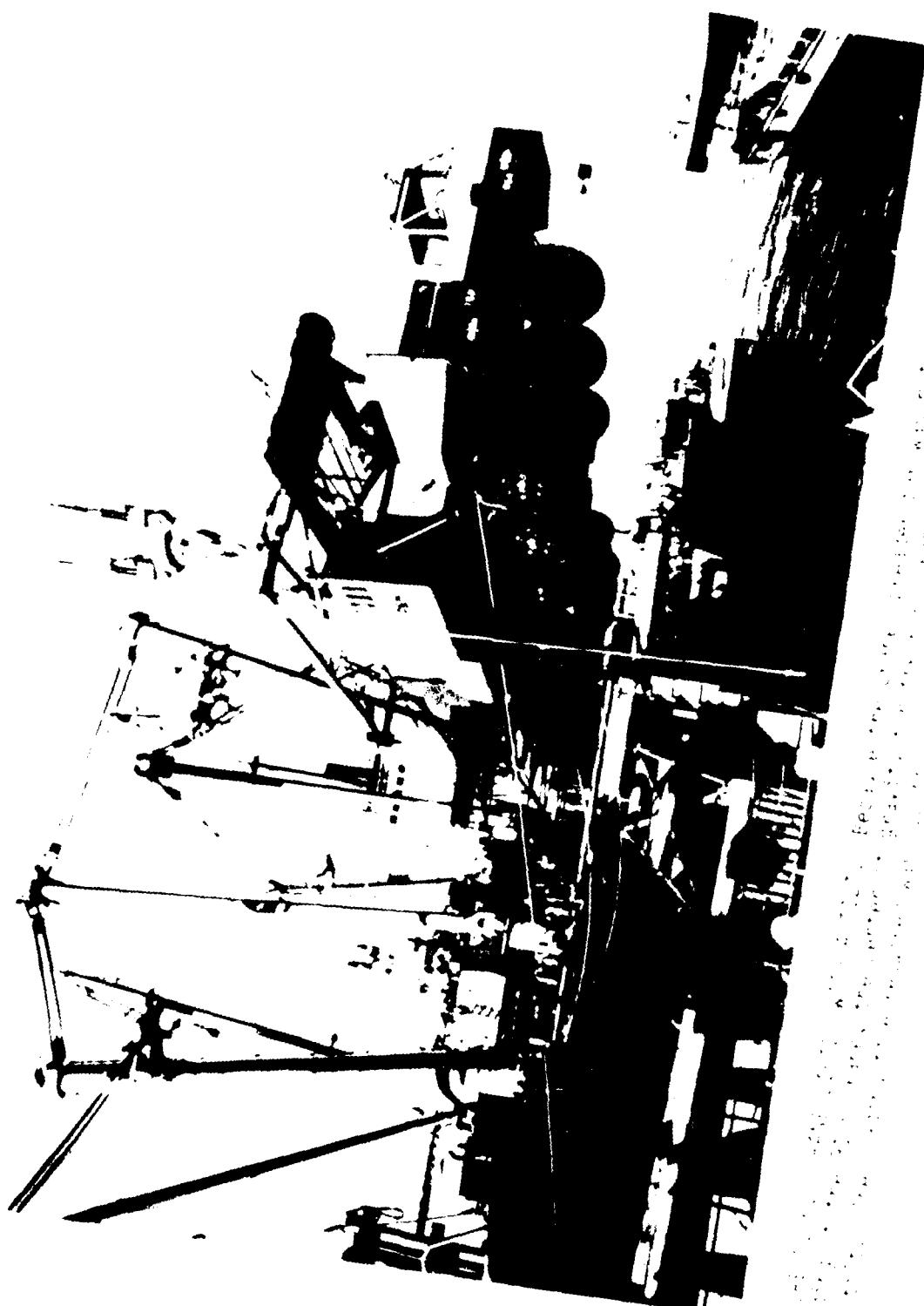








Fig. 10. A scene from a Japanese woodblock print showing a building with multiple gabled roofs, possibly a temple or shrine, with figures visible on its eaves. In the foreground, a person wearing a wide-brimmed hat and a patterned kimono walks away from the viewer. The style is characteristic of Edo-period Japanese book illustrations.

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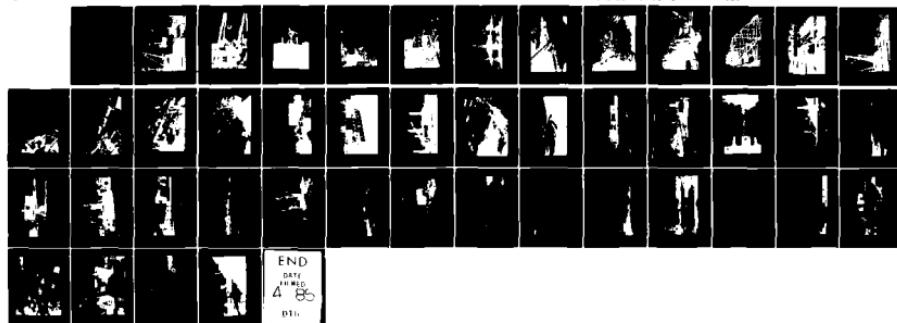
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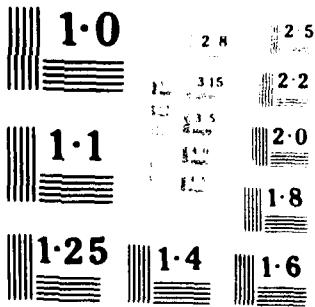




FIGURE D.29. SIDELOADER EASY LIFT. Compared to the other equipment embarked the sideloader went aboard relatively easily. It weighs 64 tons and is 41 ft long, 12.5 ft wide, and 11.7 ft high.

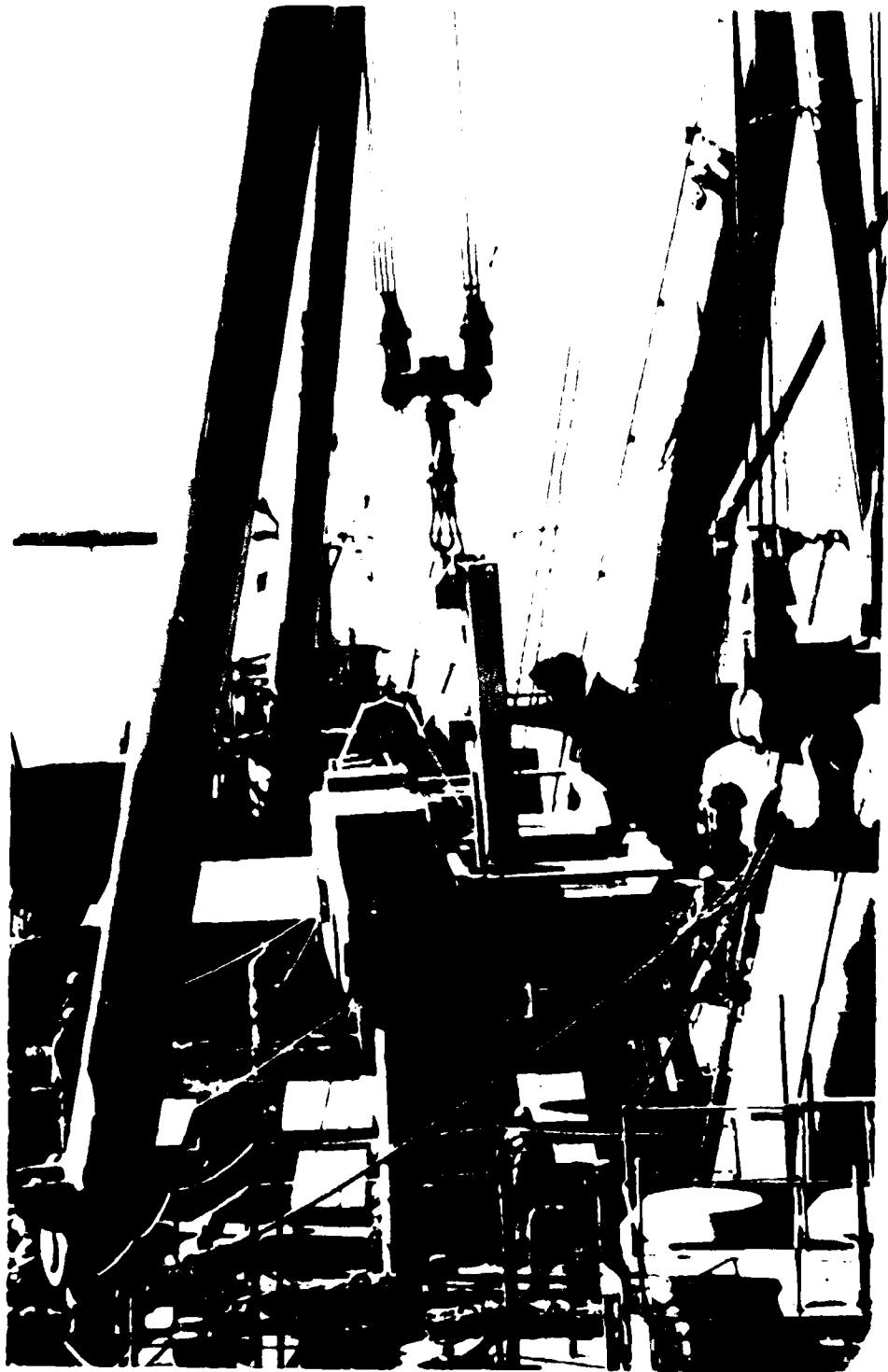


FIGURE D.30. SIDELoader DECK-STOWED. The sideloader could have been stowed in a hold but to reduce loading time so that other events could be accomplished, it was deck-stowed. Its loading time was only 27 minutes, including rigging time.



FIGURE 1-43. CIRCLE 2000 BOTTLE KIDNEY. When the bottlekidney for lifting it is necessary to clean it, wait and attach the hook to the vessel, then attach and detach the chokers on the hook required to take off the kidney. (1 minute during the lifting cycle and 9 minutes during off-loading).

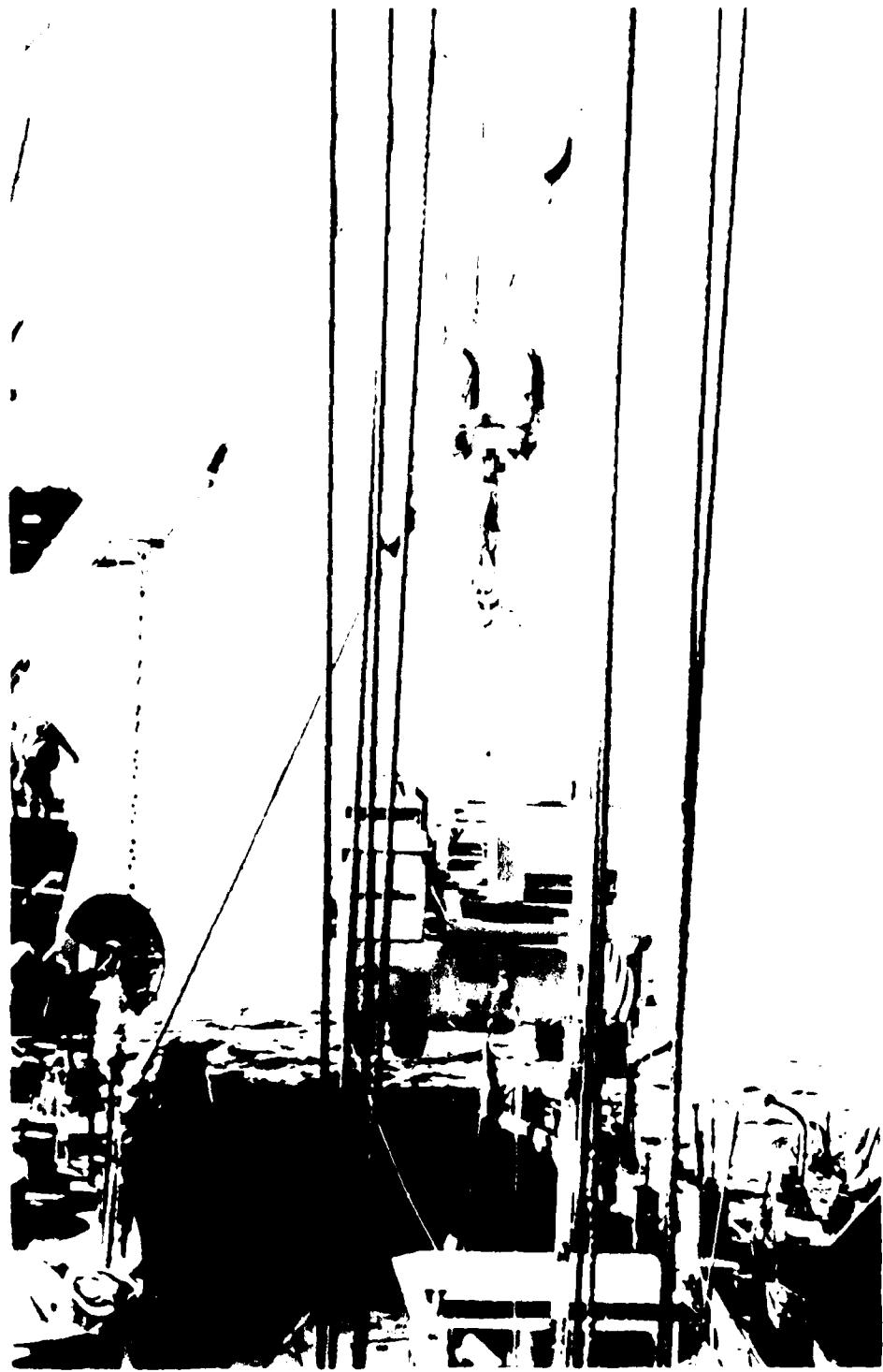


FIGURE D.32. SIDELOADER PLACED IN CLU. No difficulties were experienced off-loading the sideloder into an LCU. The sea state was relatively calm and the wind was light.

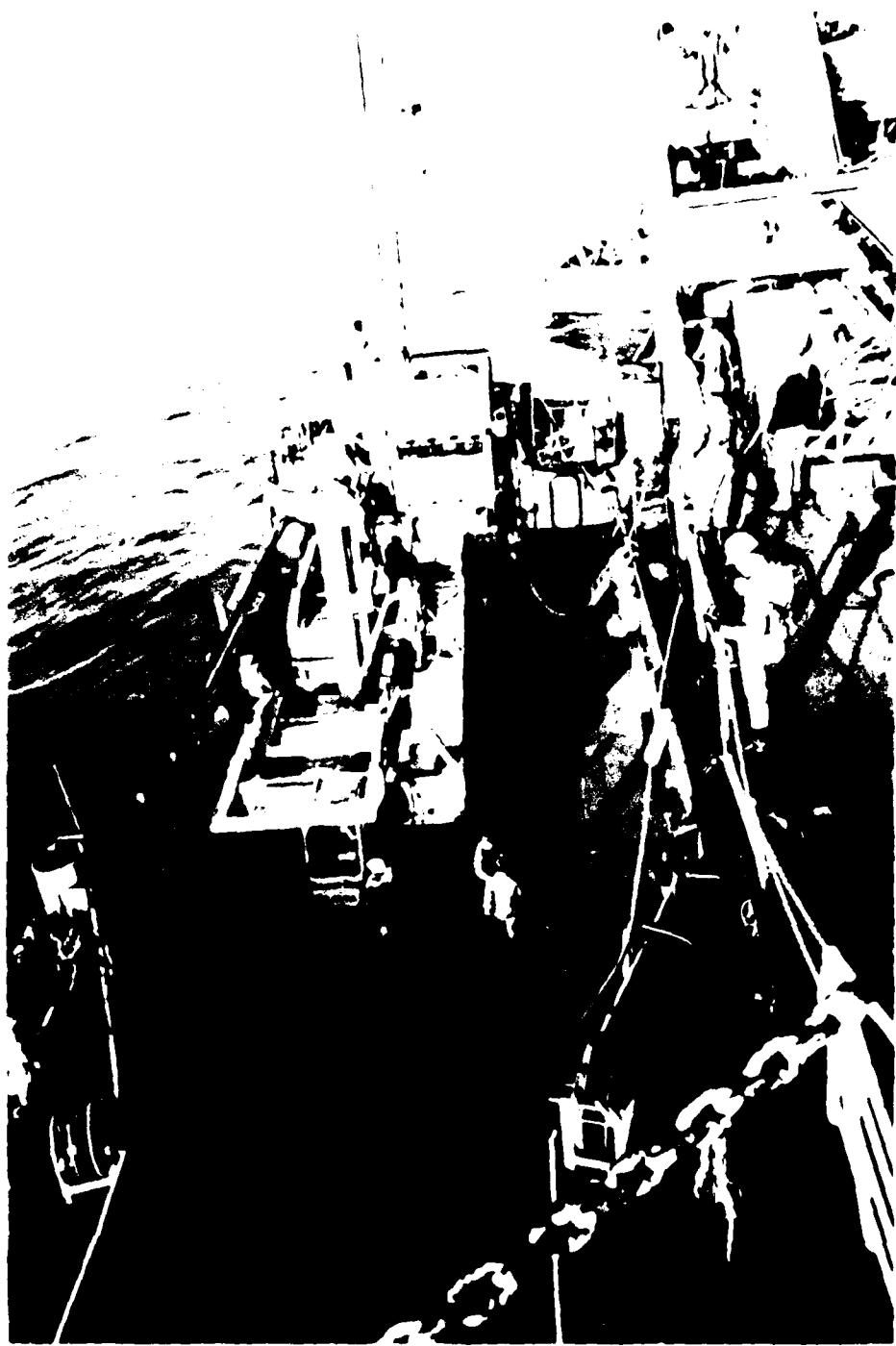


FIGURE 11. OFF-LOADING TIME 34 MINUTES. The sideloader lift was the fastest one rate. It took 34 minutes to off-load the sideloader, including time to "turn and fast off" the lift.

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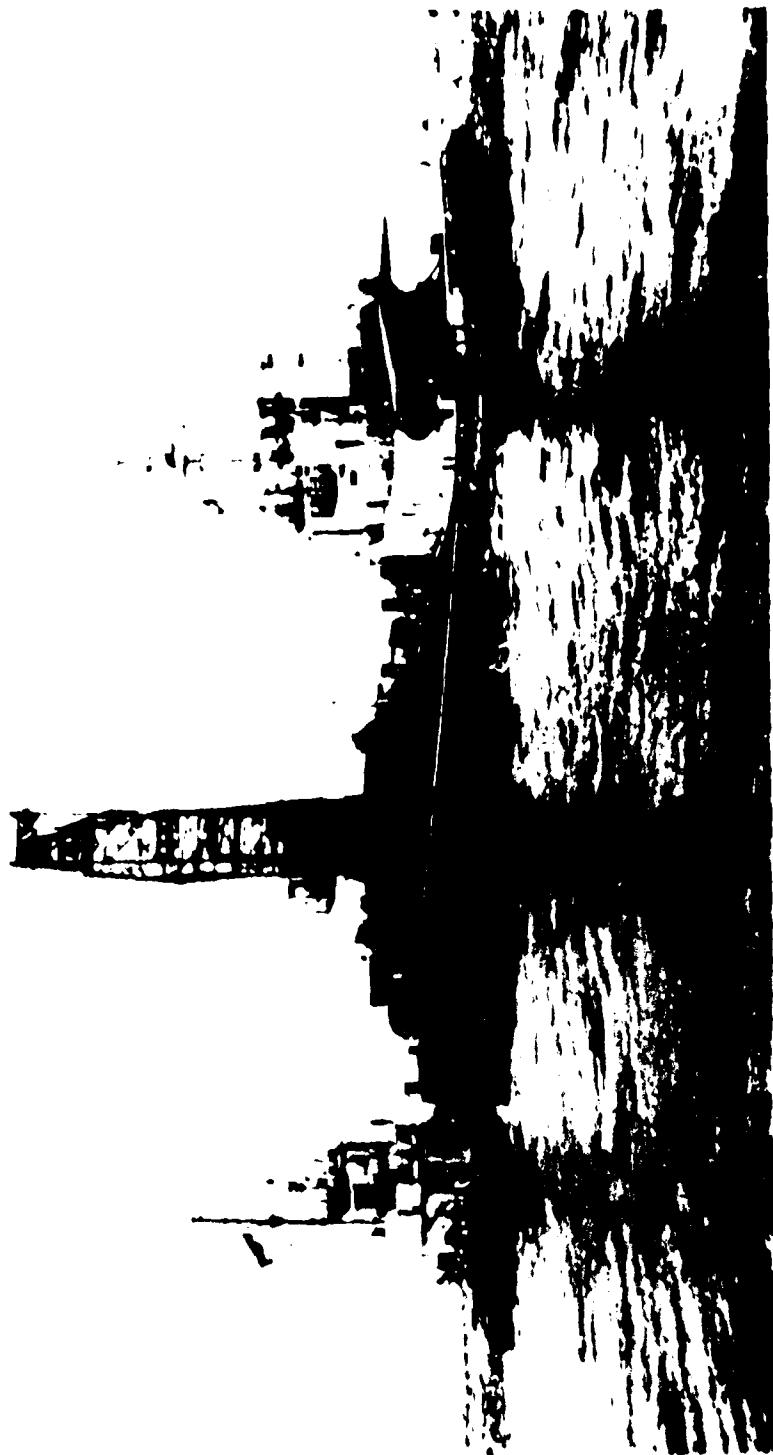


FIGURE D.34. TCDT TOWED TO PRETEST SITE. Once the deployment cargo had been off-loaded, the TCDT was positioned alongside the ship so that containers could be off-loaded and throughput events could begin.

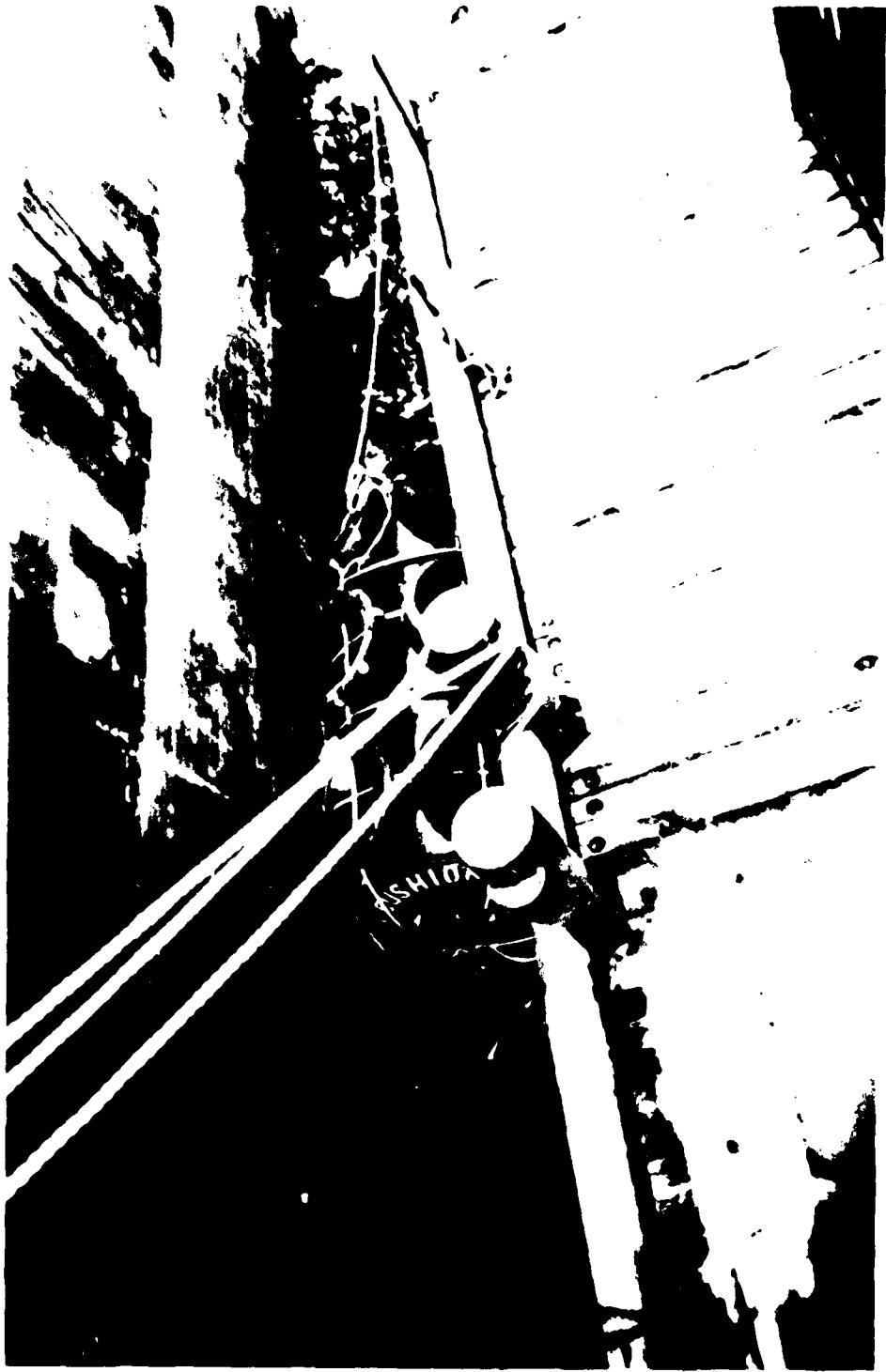


FIGURE D.35. FENDERS USED. Two special inflated fenders, one of which is shown above, were used to separate the TCOF from the ship.



FIG. 43. - After the initial load of containers had been discharged the TCCF was moved to the bow of the ship. Later, when one ton each swung into the gap at the stern, the container spreader had to be turned forward to line up with the containers. This was difficult because a two-point attachment was used between the crane and the spreader bar.



FIGURE D.37. TCDF OPENS HATCH. To gain experience and crane data on hatch square opening, the TCDF was used to remove the 5-ton sections of the hatch cover.

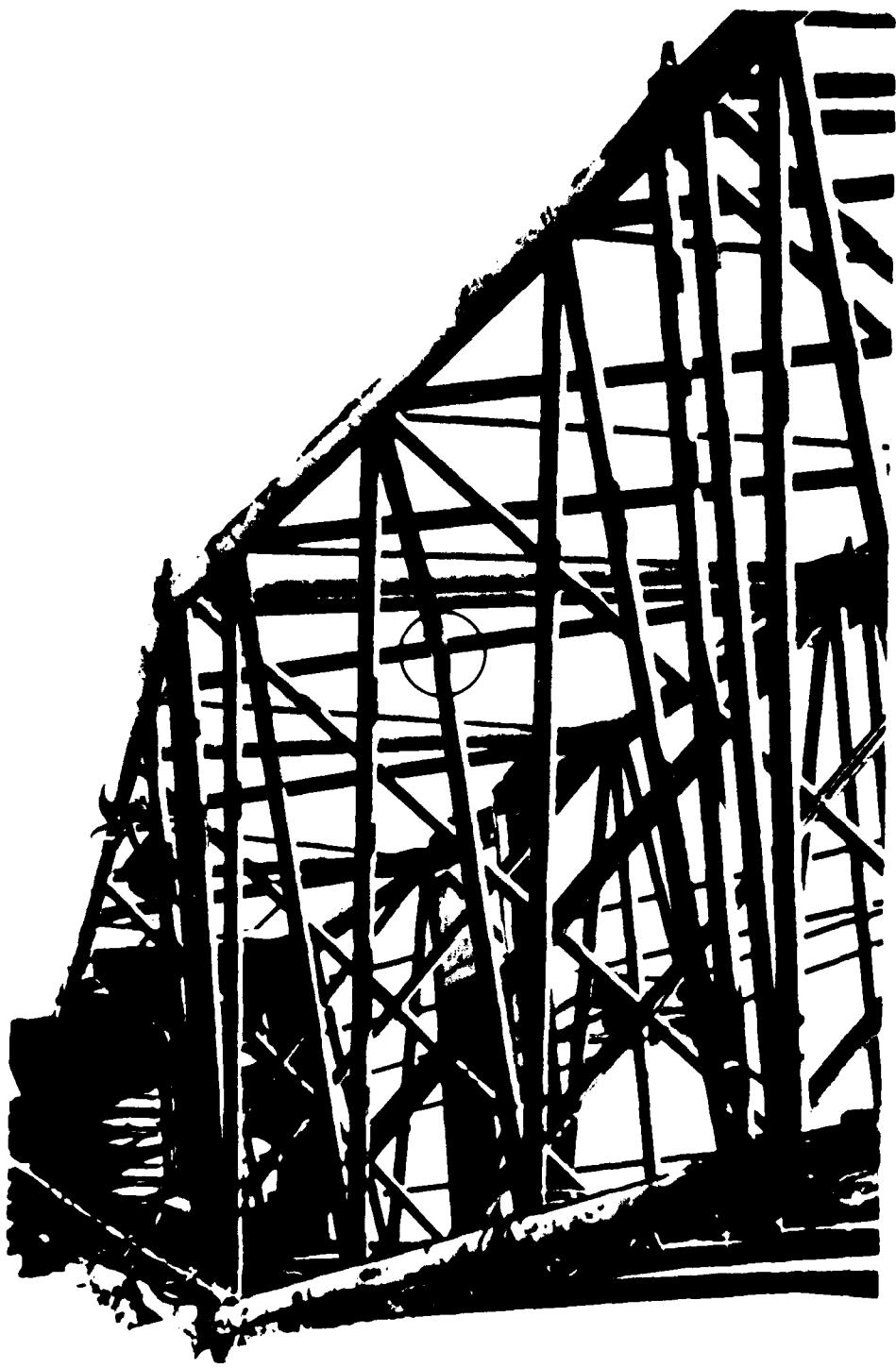


FIGURE D.38. BLOCK DENTS CRANE BOOM. On the first full day of container unloading the sea state caused the crane's block to pendulate during a break in the unloading. The heavy block struck the boom's tubing with sufficient force to seriously dent it.



FIGURE 5.39. POSITIONING SPREADER BAR. Without cell guides it was necessary to position the spreader bar manually in the hold. If the boom was not at a 90-degree angle to the container axis, delays and difficulties in attaining the spreader bar were experienced.



FIGURE 5.40. B&W PHOTO OF A CRANE RAISING A CONTAINER ON THE DECK OF THE SHIP. SINCE THE CONTAINER WAS ATTACHED TO THE CRANE, IT WAS NECESSARY TO RAISE THE CRANE IN ORDER TO CLEAR THE SHIP'S BOW AND KINGPOSTS. THIS IS A DELAY TO CYCLE TIMES THAT WOULD NOT BE TYPICAL OF OPERATIONS ON THE CLEAR DECK OF A CONTAINERSHIP.

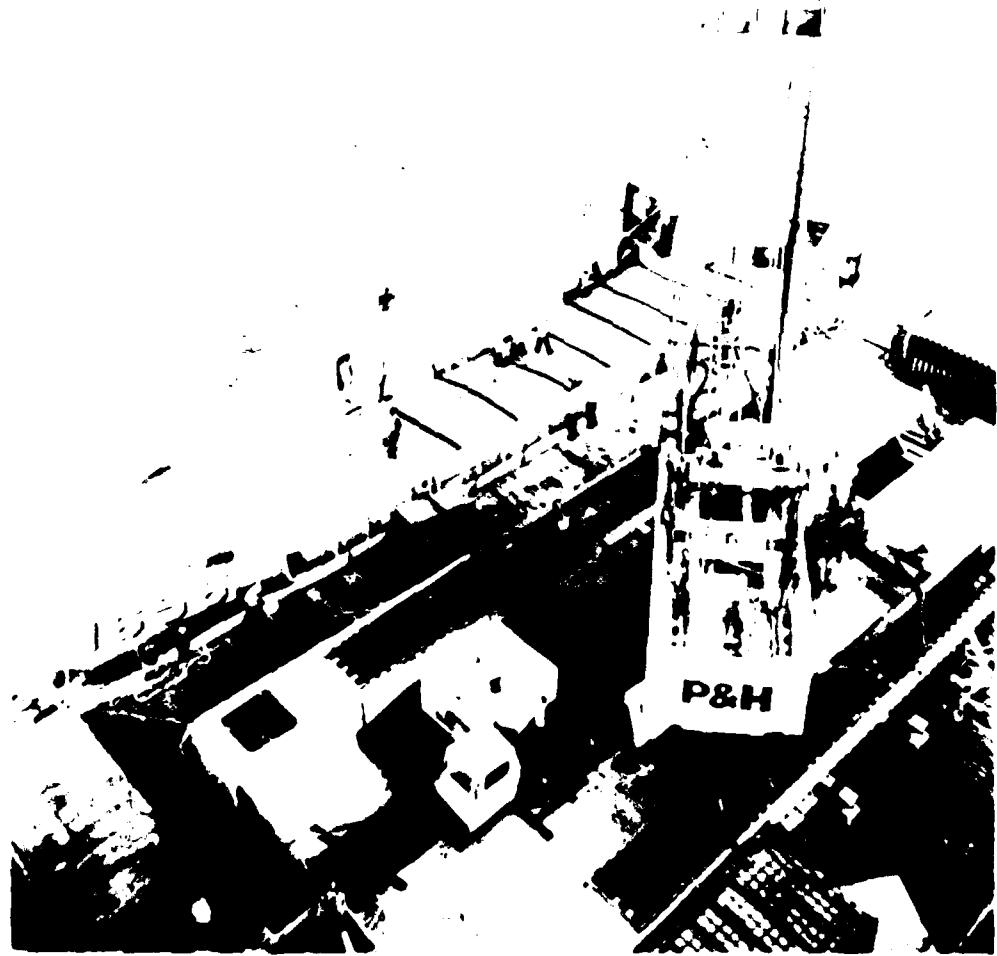


FIGURE D.41. LCU USED FIRE HOSE. To cushion the impact of containers being lowered, a problem when there is a sea state, fire hose was used on the deck of this LCU.



FIGURE D.42. LCU LIGHTLY LOADED. Normally an LCU would be loaded with four containers but because of the limited number of containers available, capacity loading was not practiced.



FIGURE D.43. MOBILE LOADING TIME-CONSUMING. One method of minimizing handling at the beach is to place trailers on a causeway ferry and load the trailers shipside. However, because of the motion of the seas and the need for close alignment during loading, it required approximately an hour to load just two of three trailers and it became apparent that the method was too time consuming.

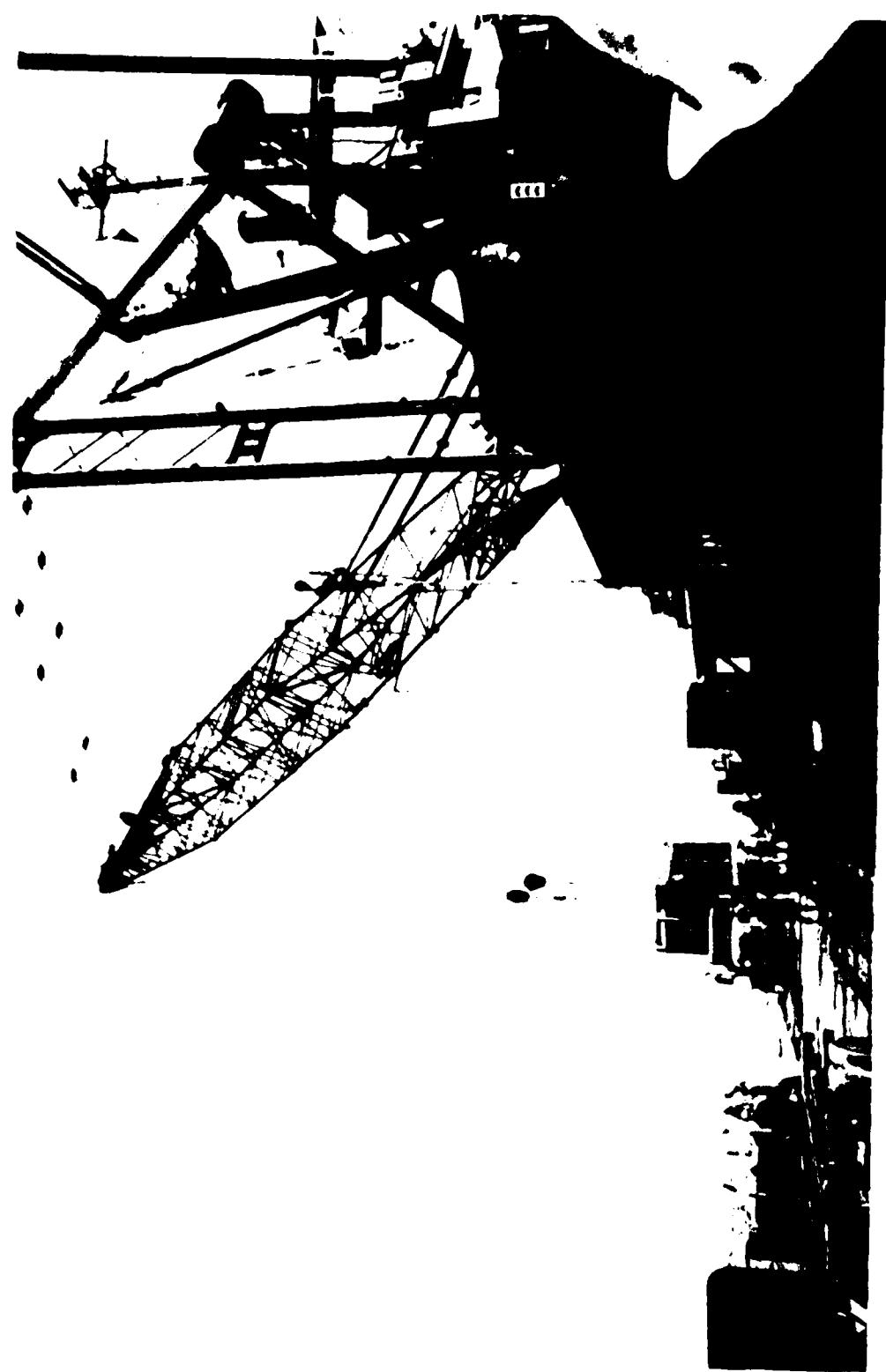


FIGURE D.44. SPREADER BAR NOT ATTACHED, WITH A TWO-POINT SPREADER BAR ATTACHMENT AND AUTOMATIC TAILIRES. The spreader bar and container were nearly always perpendicular to the ground, while the trailer chassis was not. This necessitated "fan-handling" the container during transport in a position that would permit lowering the trailer corner fittings.

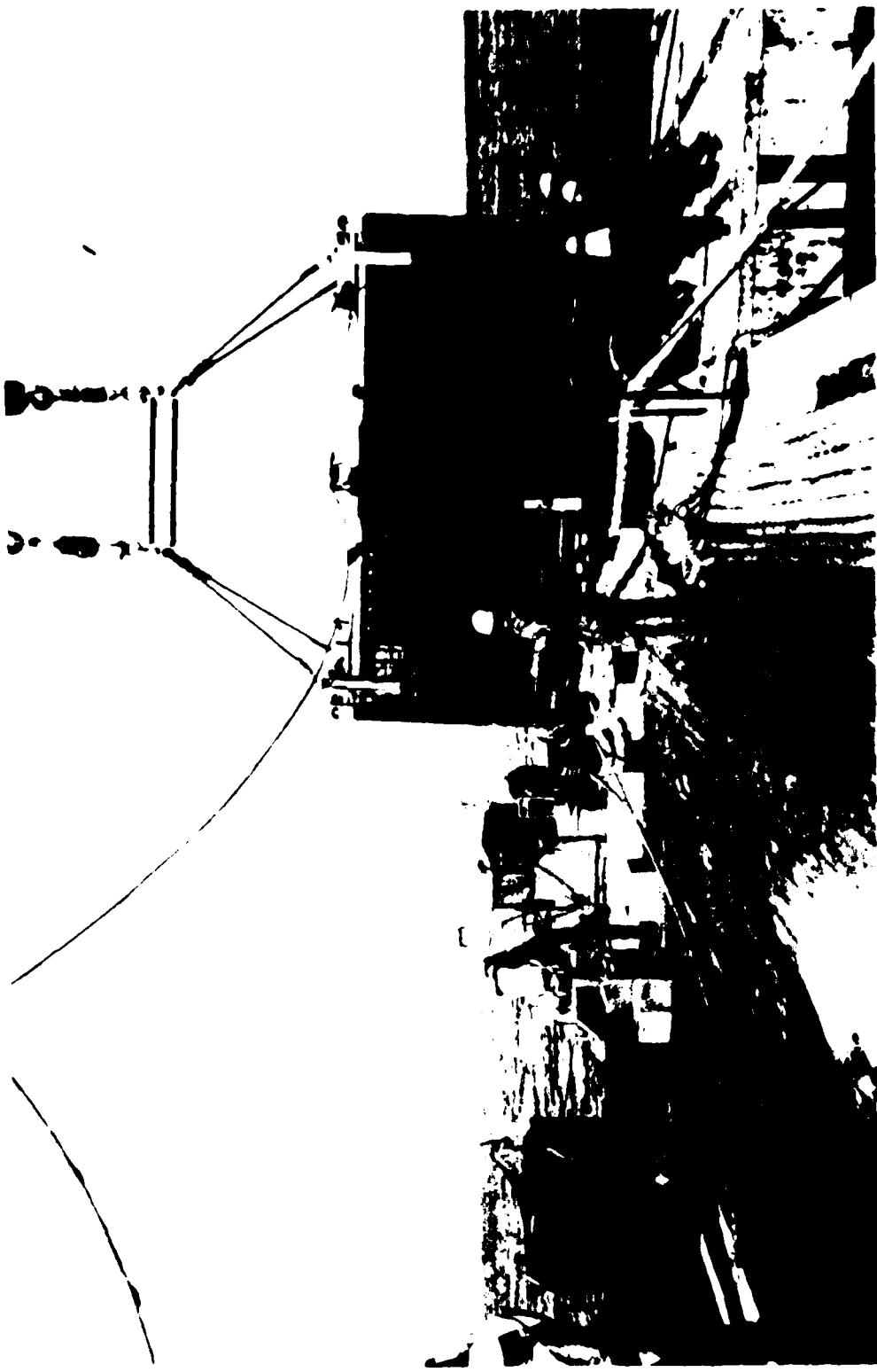


FIGURE D.45. ALIGNMENT DIFFICULTY. Aligning the container with the trailer required from 4-5 attempts to force the container into position so it would engage the corner fittings. Because the procedure was so time-consuming one trailer returned to the beach without being loaded.

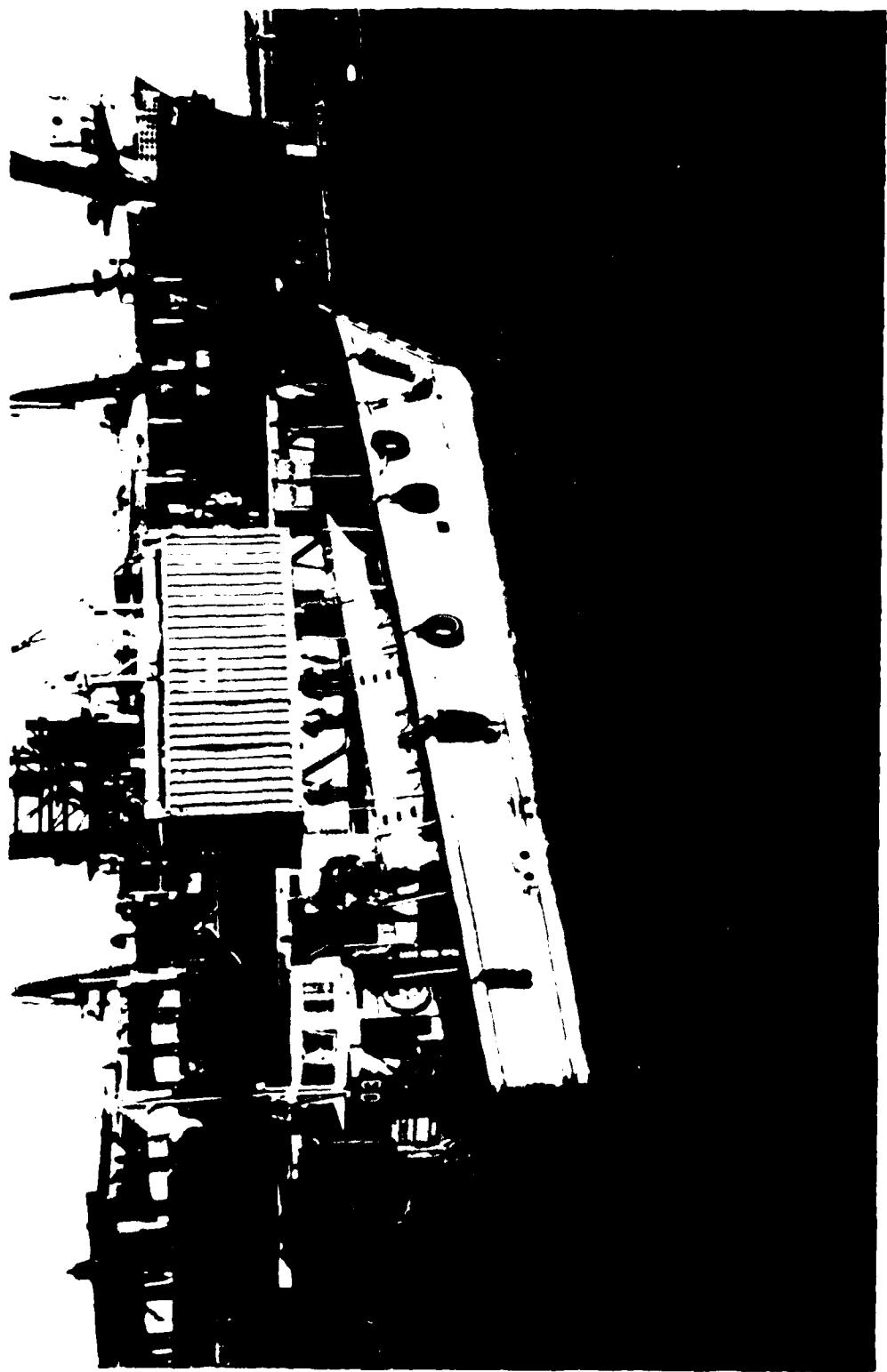


FIGURE D.46. LCM8s USED. LCM8 landing craft received extensive use in the pretest and had better beaching capabilities than LCUs, although both were unable to beach close enough to shore cranes at low tide.

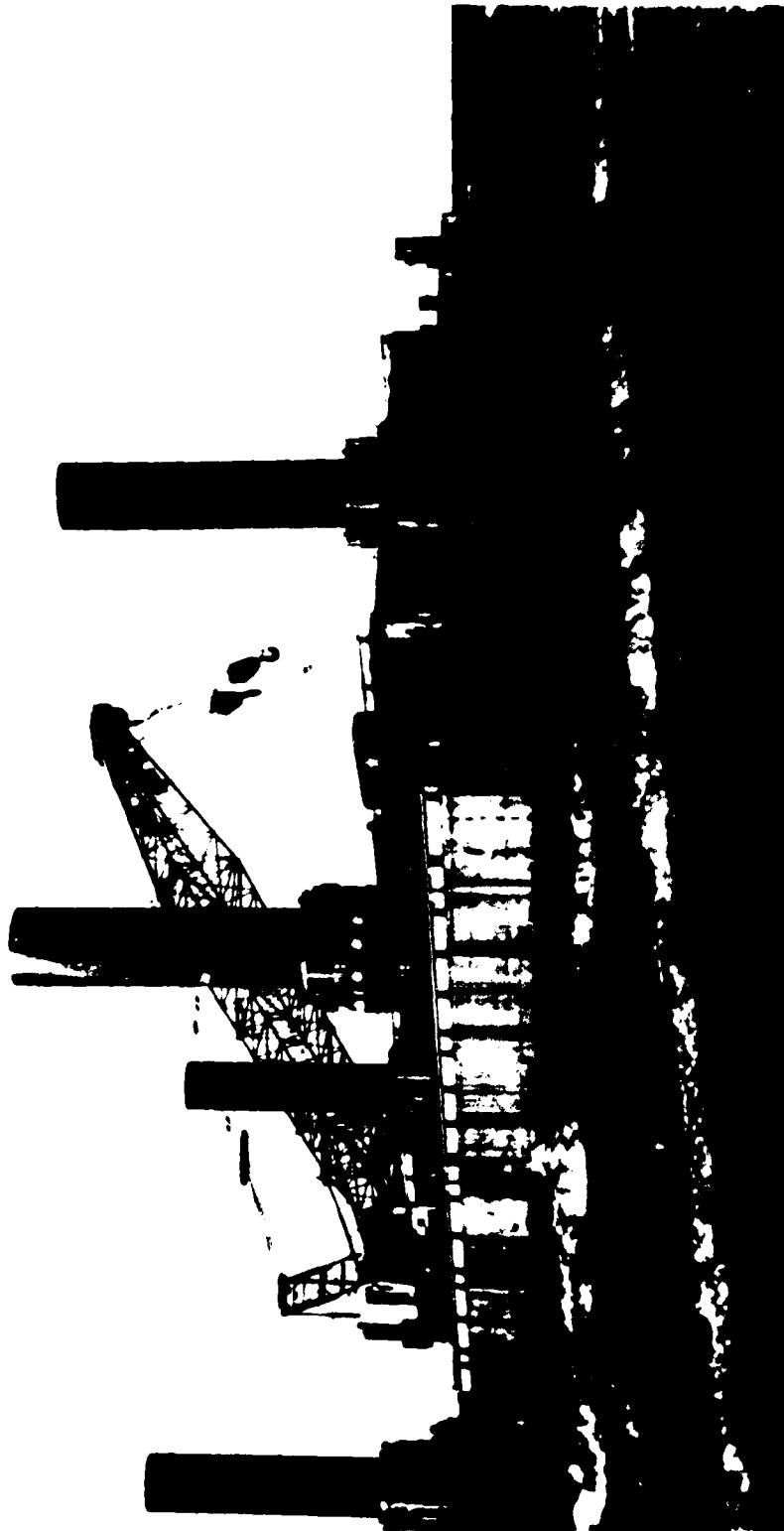


FIGURE D.47. DELONG PIER POSITIONED. To improve shoreside unloading capabilities a 140-ton crane was positioned on a Delong barge and towed to the objective area. The Delong was beached using two LCMs. Later the Delong was jacked-up out of the water on its pilings and ramps were added so that trucks could drive from the beach onto the pier.



FIGURE D.48. LCU RETRACTS. An LCU is shown above retracting from the DeLong pier after unloading at high tide.



FIGURE 2.49. A MUD CRATE IN TIDEWATER. Because of the verticle beach gradient and the fact that a single Belong does not extend far enough seaward, landing craft were stranded at low tide. At low tide only amphibians could be unloaded.



FIGURE 5C. 2001-02 BEWC. Truck drivers experienced difficulty backing their trailers up the ramp so a rough terrain carrier, which has articulated steering, was tried. The above A1/B ramp connects onto the Telong ramp. The A1/B ramp was subsequently replaced by a sand ramp.

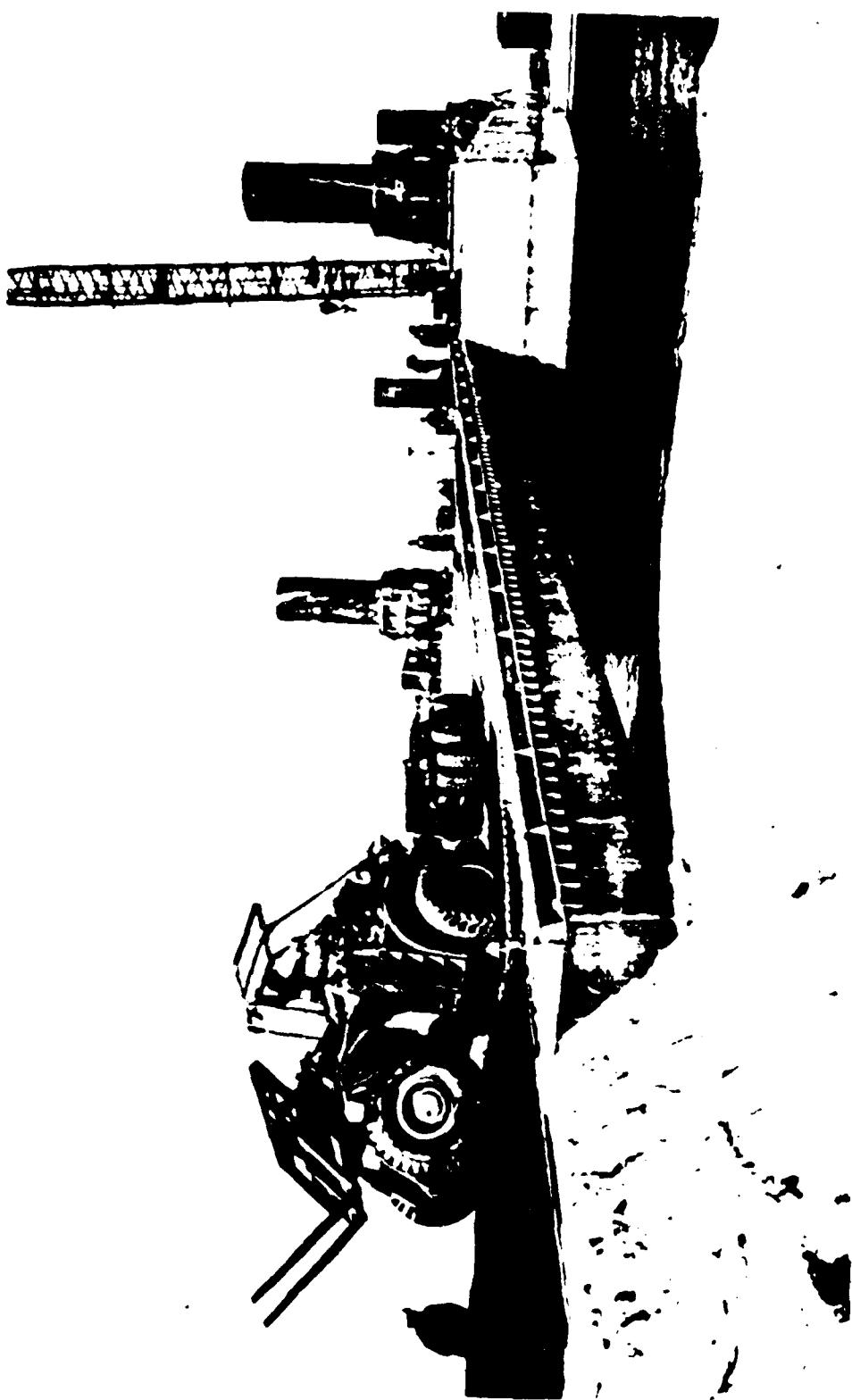


FIGURE D.51. CRANE DELAYED. Until the trailer was positioned under the crane, operations were choked. With experience drivers were able to more rapidly back their trailers up the ramp.

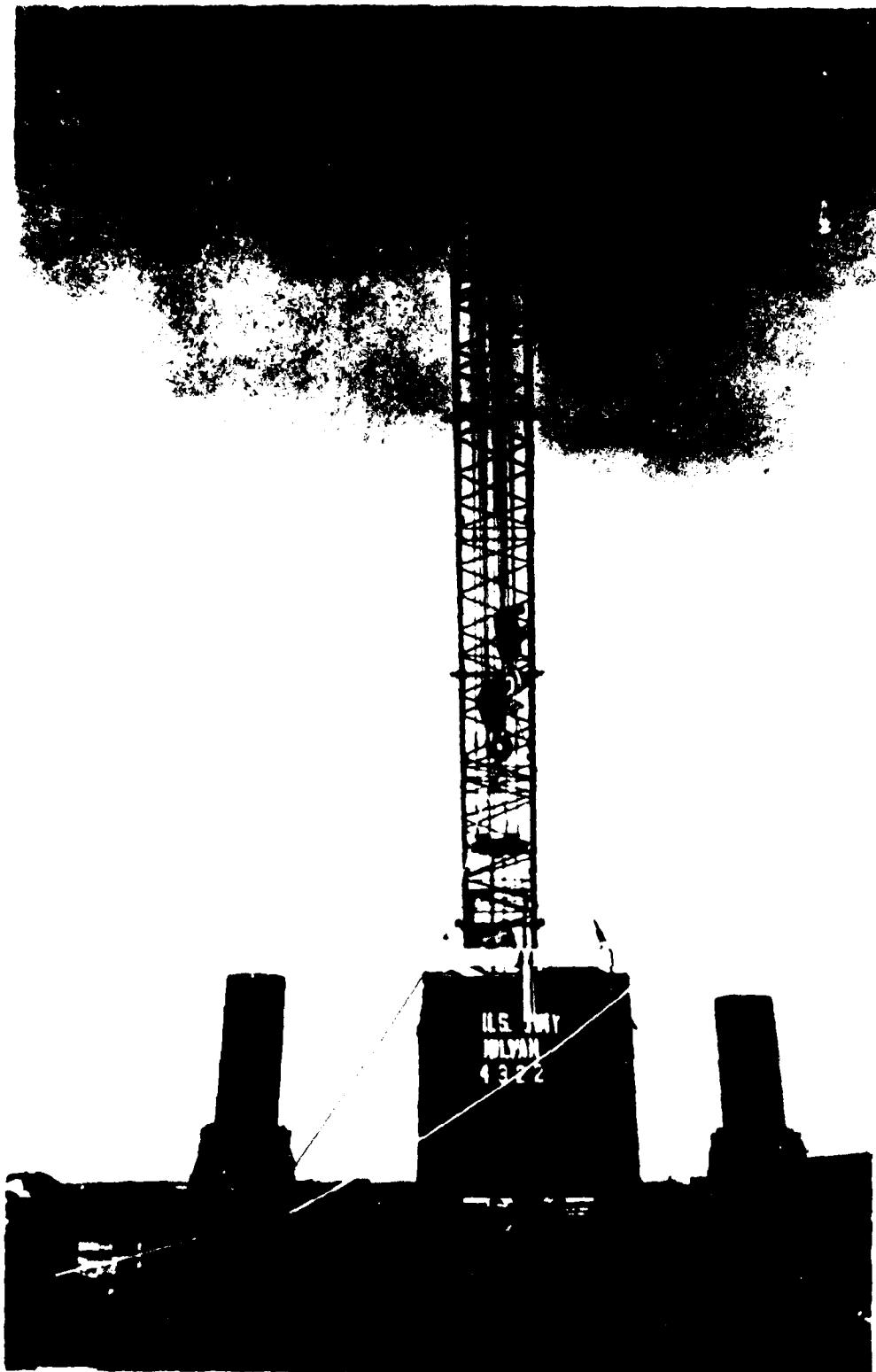
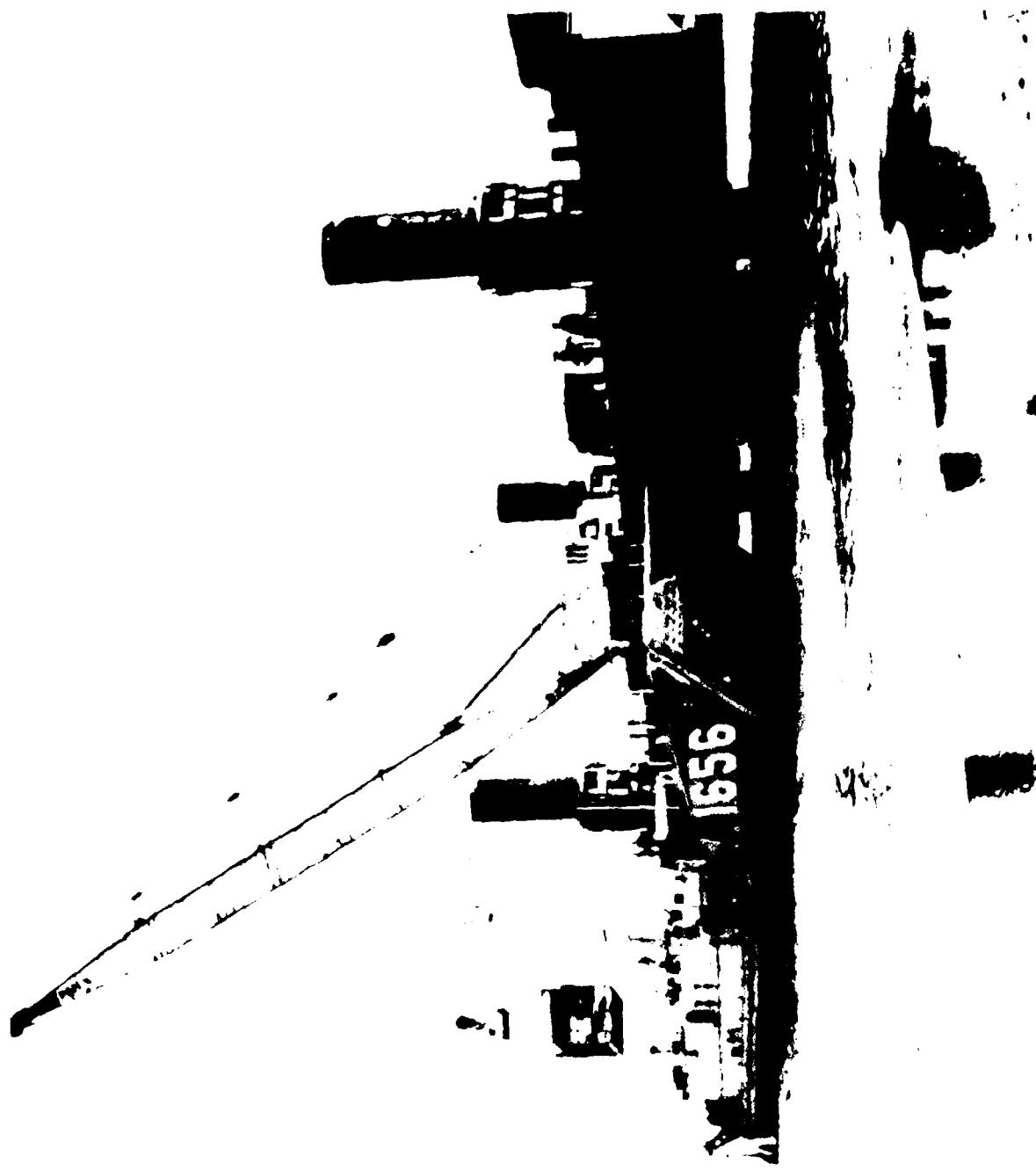


FIGURE 10 - TRAILER IN POSITION. Once the milvan chassis was on the trailer, the trailer was lowered.



THE JOURNAL OF CLIMATE

1945. 12/10/45. The best method of protection against heavy snows is to lay a layer of straw over the snow. This will prevent the snow from melting and refreezing.

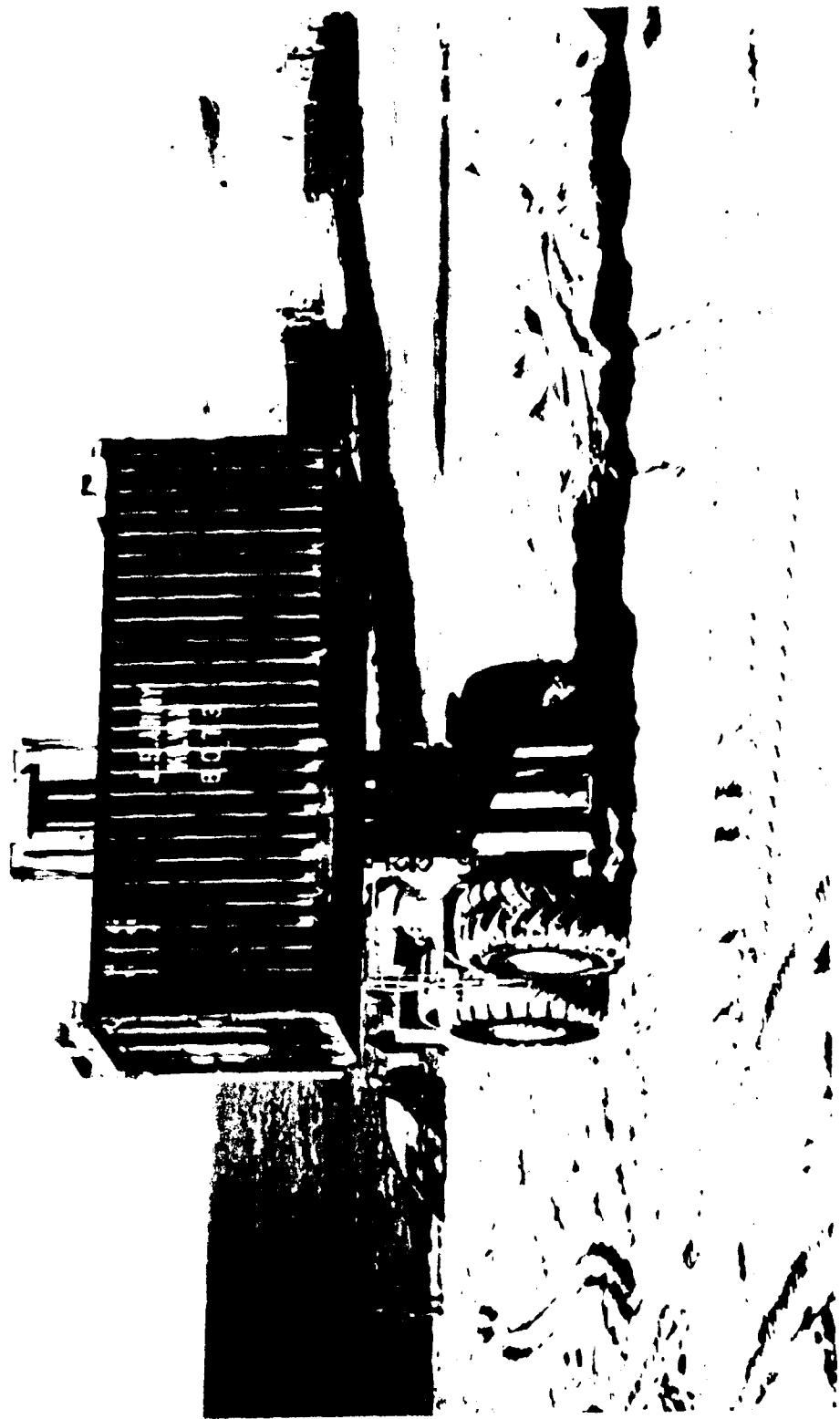
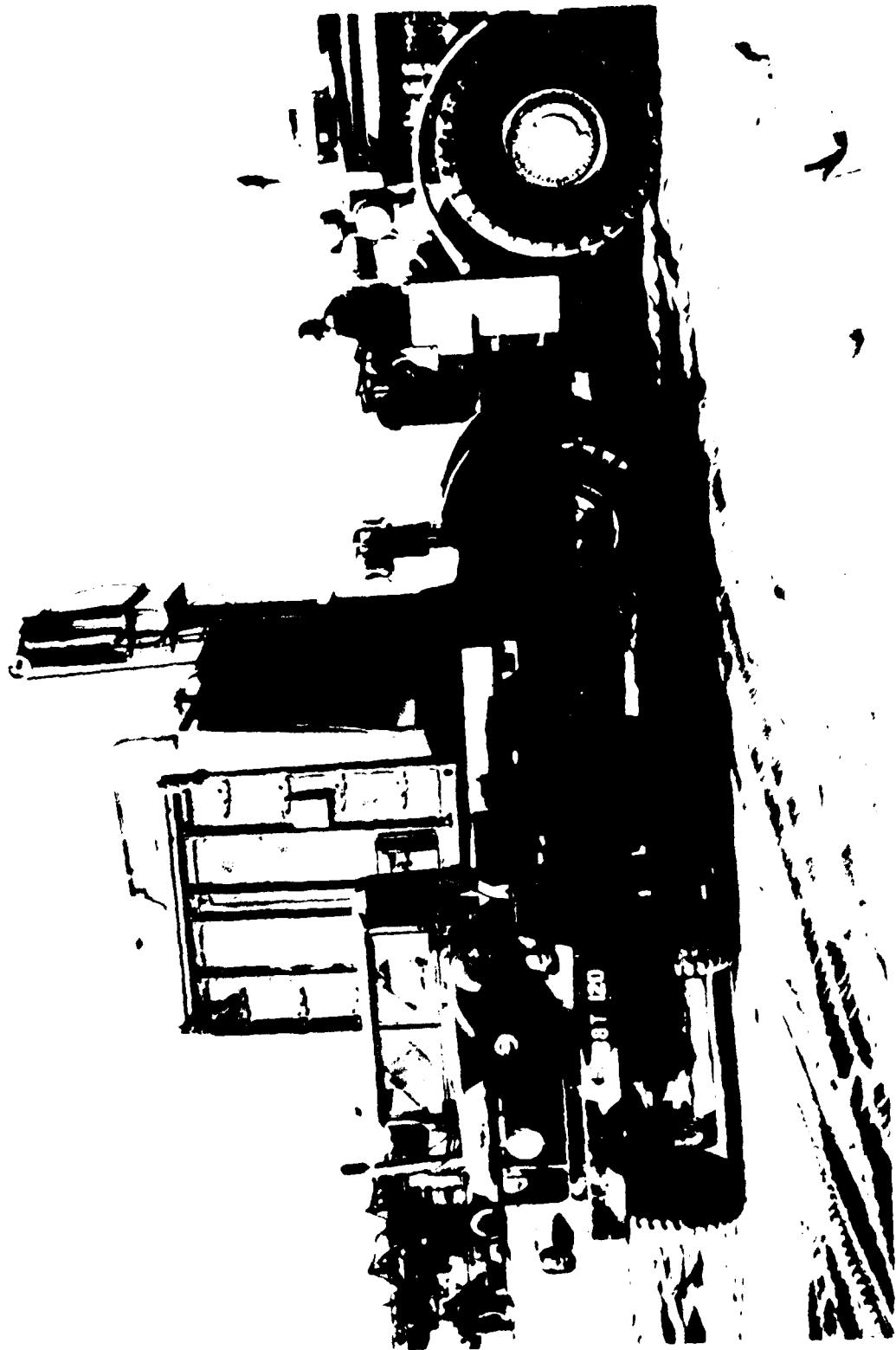


FIGURE 10. A U.S. Army M-1951 field ration carrier carrying a 1-liter container. Note the absence of a canister holder, which was necessary.





U.S. NAVY TANK ON BEACH
This photograph shows a U.S. Navy tank on a beach. The tank is positioned in front of a building and some trees. The vehicle has "U.S. NAVY" and "422" painted on its side. A large, circular device, possibly a searchlight or antenna, is mounted on top. The background shows a shoreline with trees and a building.

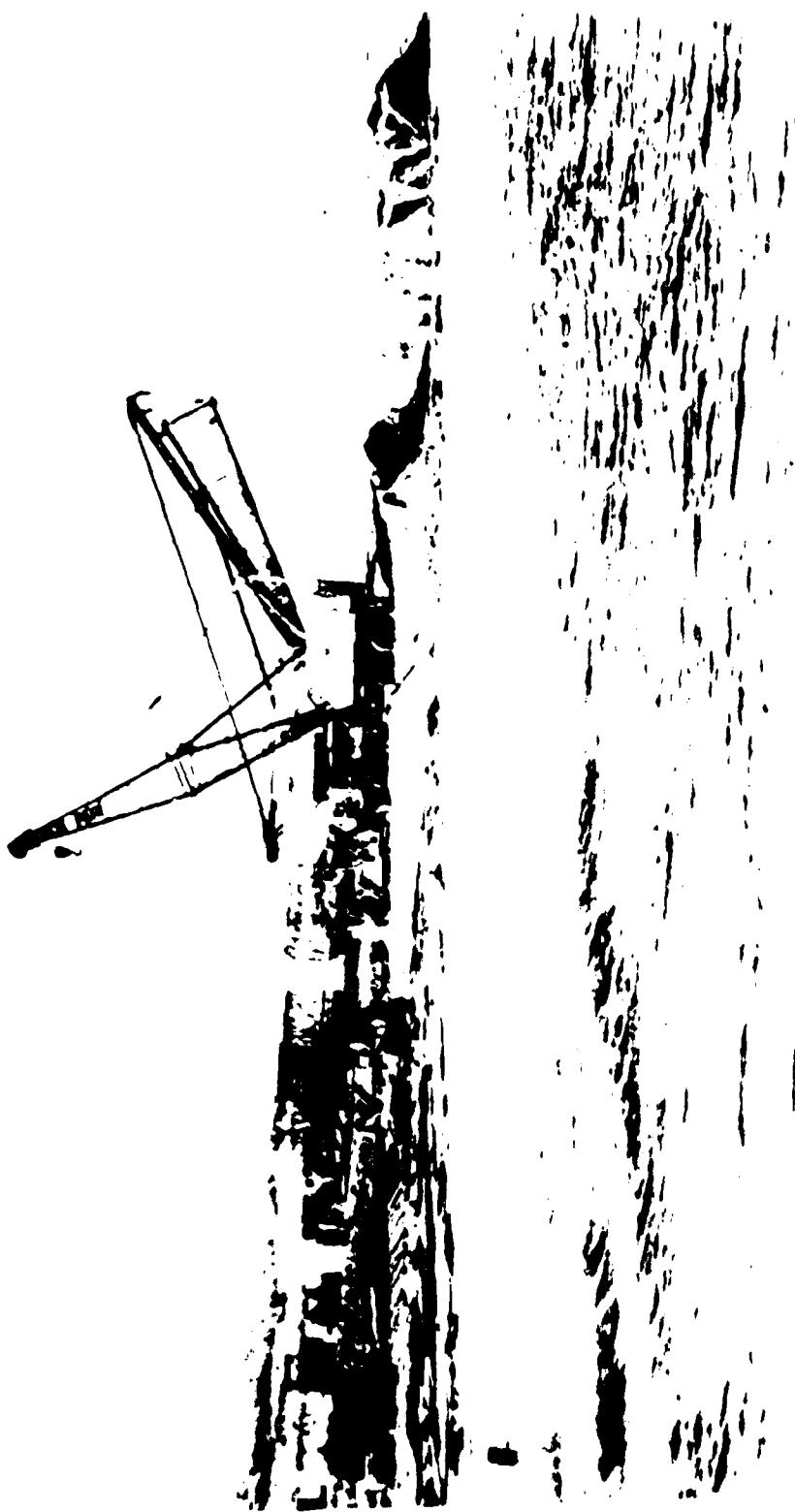


FIGURE 1. 300-TON LATTICE BOOM CRANE. Since the 300-ton crane was landed and turned around, its assembly could be completed in required 2 days before being operational, although no night operations were conducted and no power supply were given. Reversing the crane took the time necessary for setting up cranes for minimum space requirements.

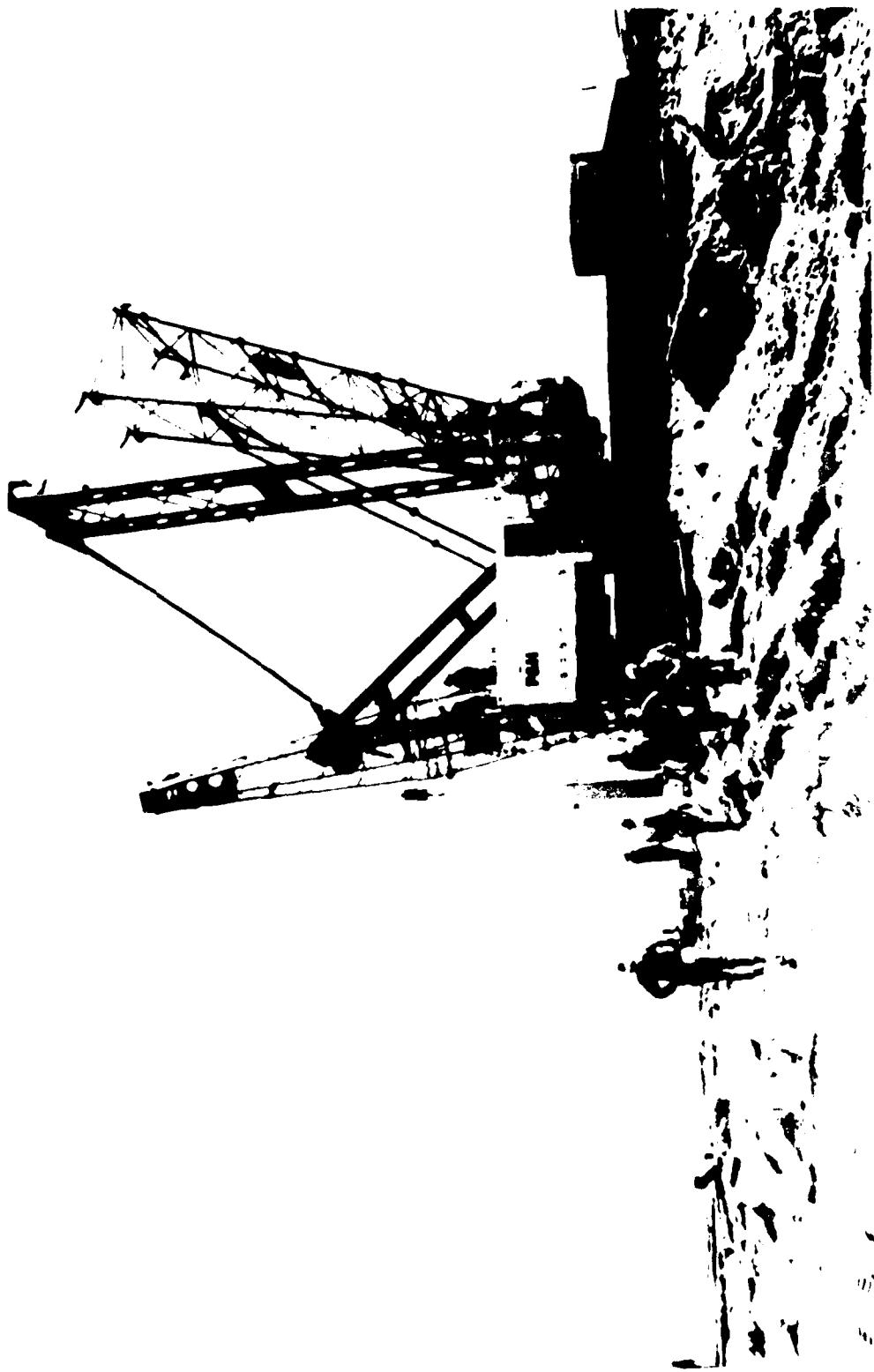


FIGURE D.59. 140-TON CRANE ASSISTS. To recover tire lost in turning the 300-ton crane, a 140-ton crane assisted in reassembly. Notably, the 300-ton crane can make itself operational without assistance.

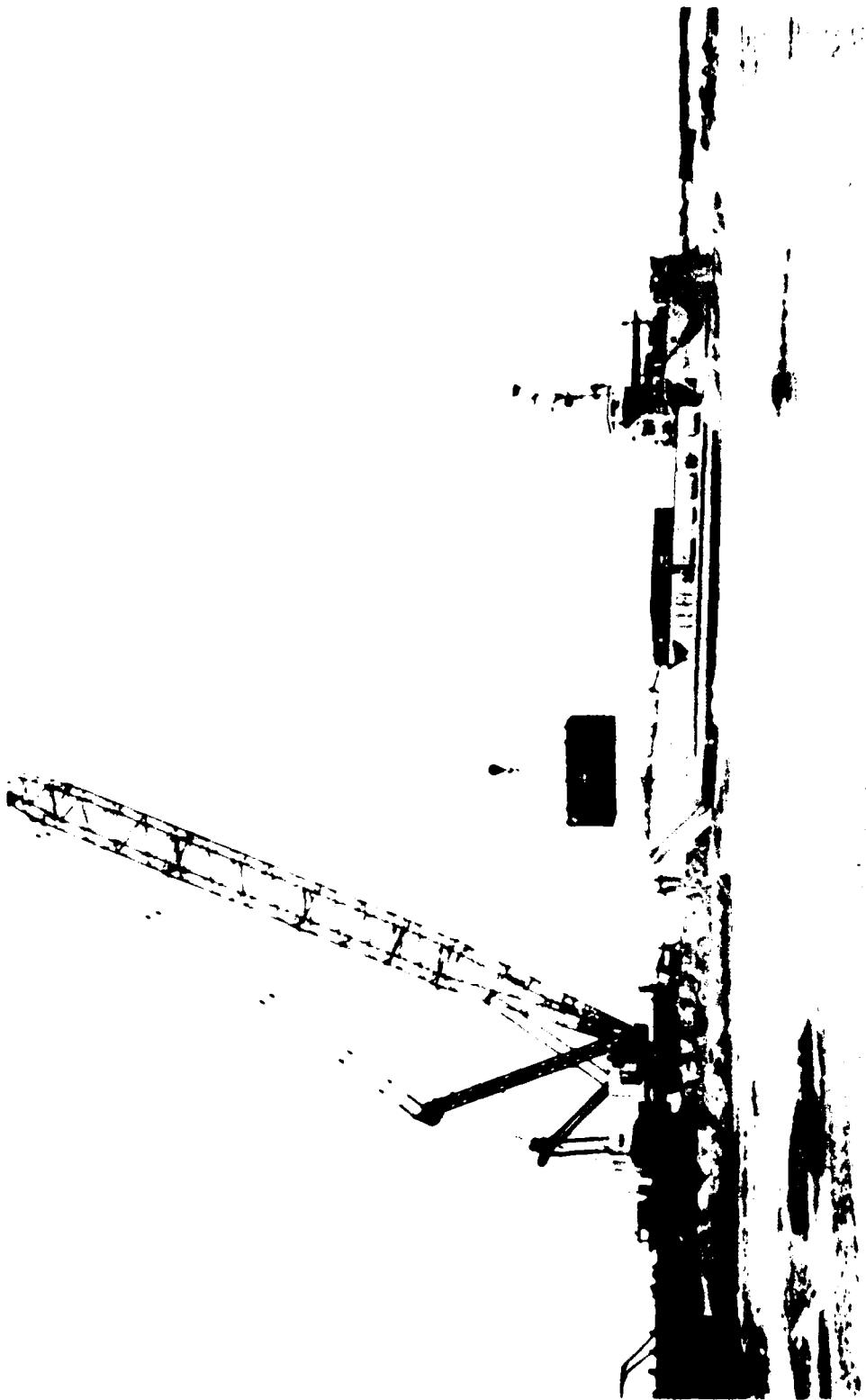
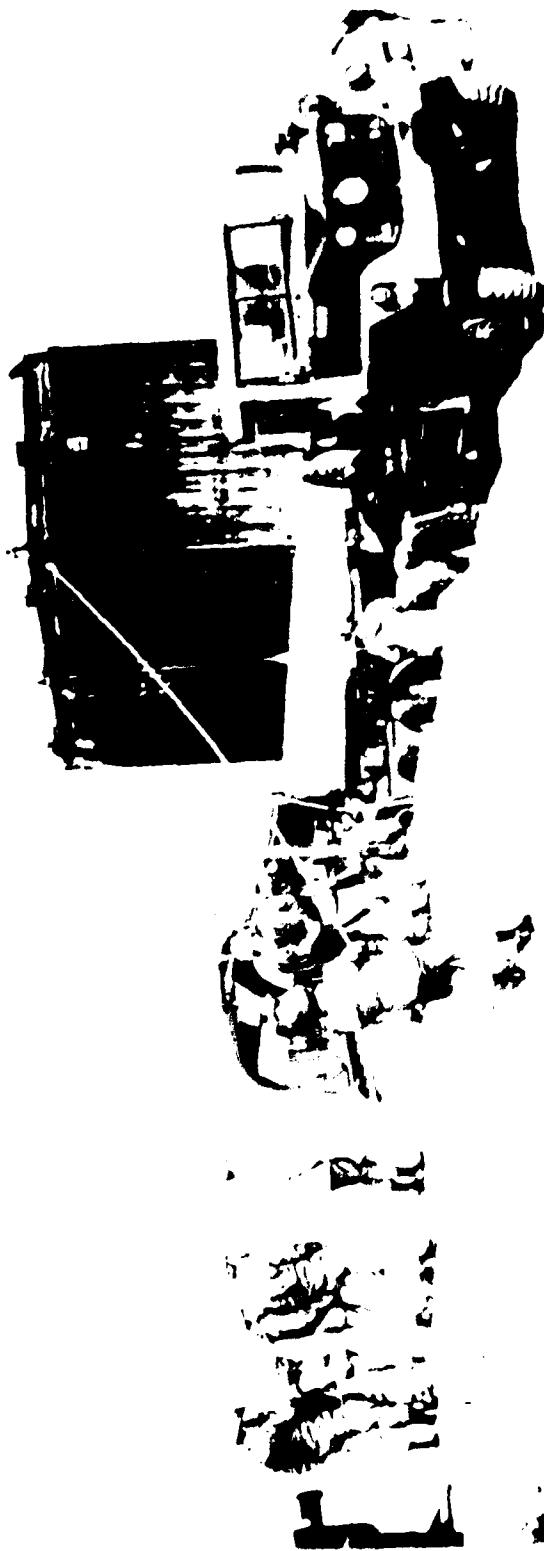


FIGURE D.60. HIGH TIDE OPERATIONS. At high tide landing craft were able to beach without reaching distance of the beach crane and were unloaded without difficulty.

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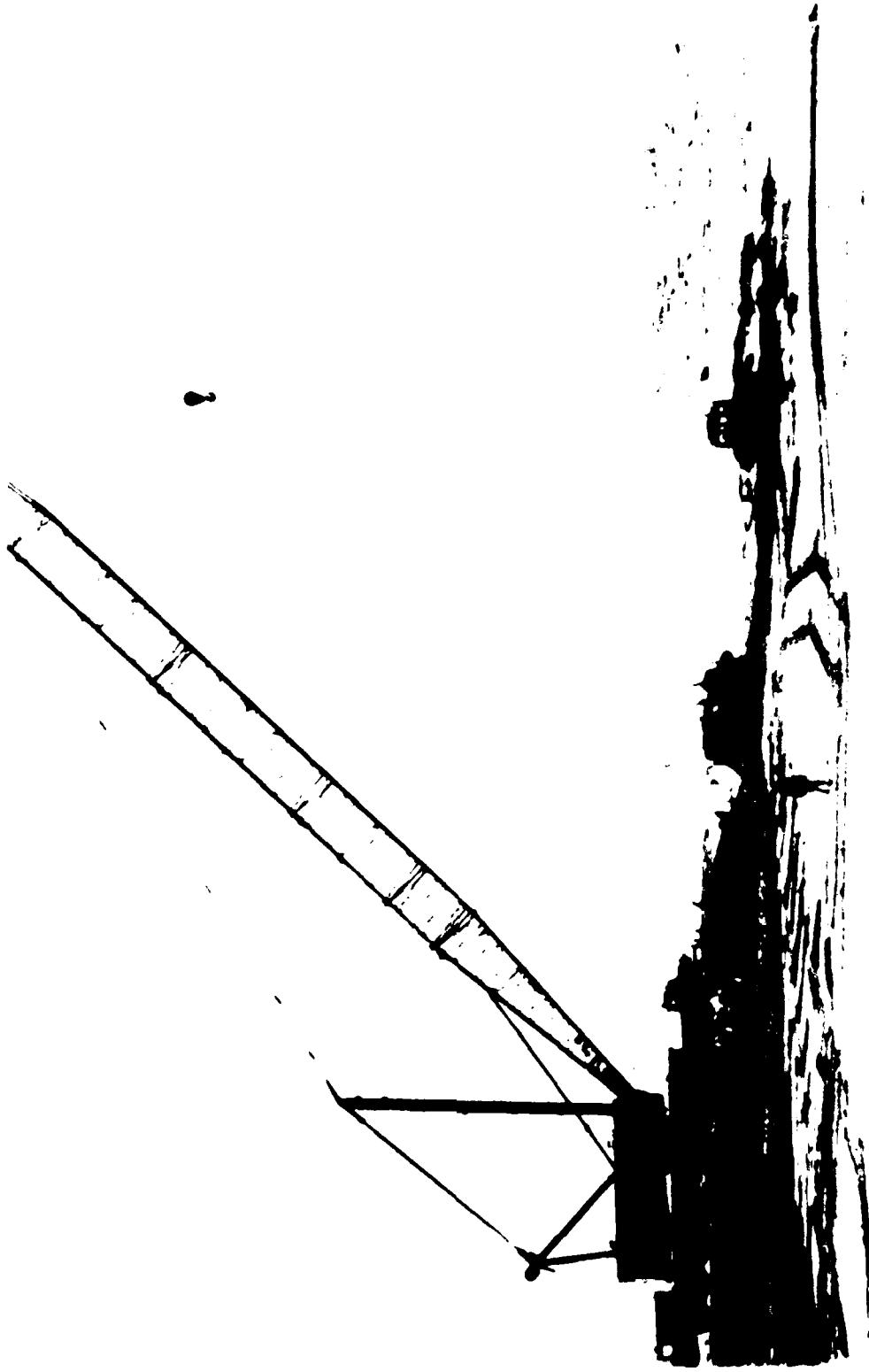


1922. This is the first time that I have seen a specimen of *Leptostylus* which has been collected from a tree which had not been felled. It was found in a hollow in the trunk of a living tree.





FIGURE 5.63. LUMMI ISLAND. In an effort to keep the beach crane (operational) a channel was dredged seaward of the crane by bulldozers.



D-64

FIGURE 5.64. CHANNEL A - 51. At approximately 11 hr of dredging, it was apparent that a channel deep enough could not be maintained. The above photo was taken about 30 minutes before low tide.



D-65

FIGURE D.65. ROUGH WEATHER EXPERIENCED. Another problem was encountered when the surf and winds increased. The sand ramp upon which the crane had been placed began to erode and had to be repaired at high tide by dozers.

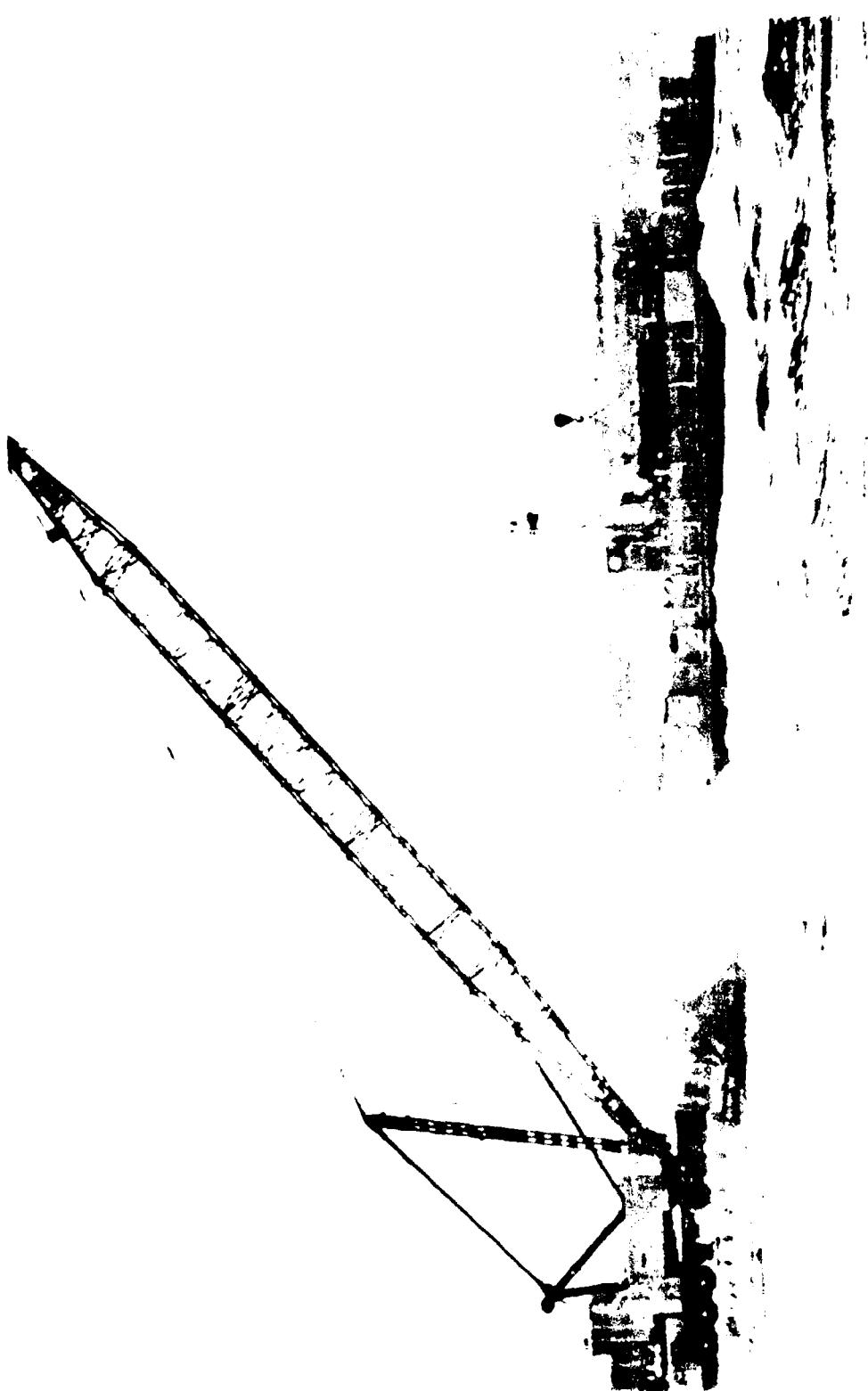


FIGURE 7.66. CORE CONTAINER, SITE A-E. Core container unloading was possible before the heavy weather required cessation of operations.

RECORDED IN THE NAME OF THE UNITED STATES OF AMERICA
BY THE UNITED STATES ATTORNEY'S OFFICE
FOR THE DISTRICT OF COLUMBIA

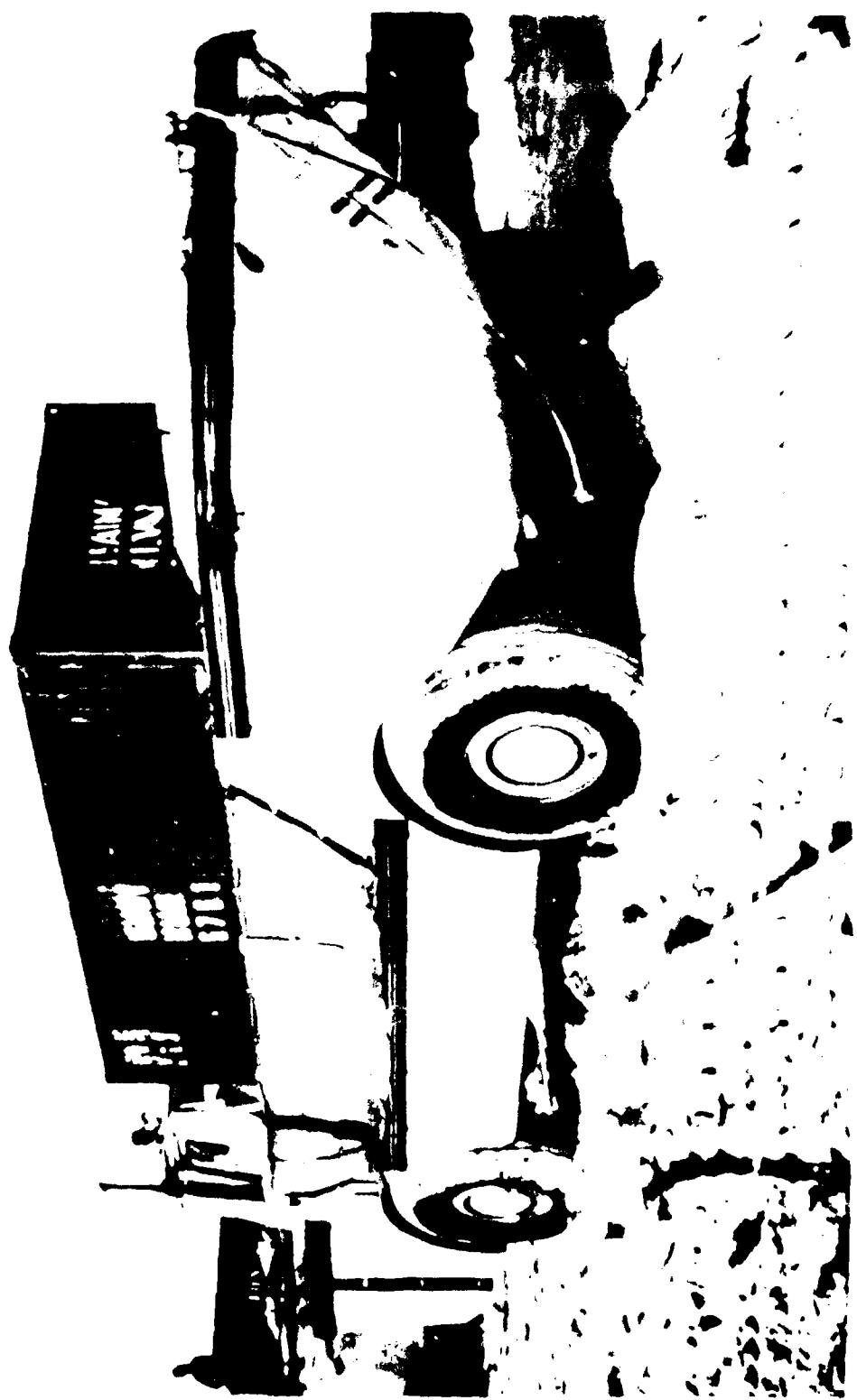




FIGURE 1. Foliage and bark of *Juniperus chinensis* var. *spicata* at the stage of fruiting, and a specimen of *Juniperus chinensis* var. *spicata*, a slender cedar growing near the village of Krasnaya Polyana, which was collected by V. N. Slobodchikov. The latter, like the former, was more similar to the off-leaved arborescens.

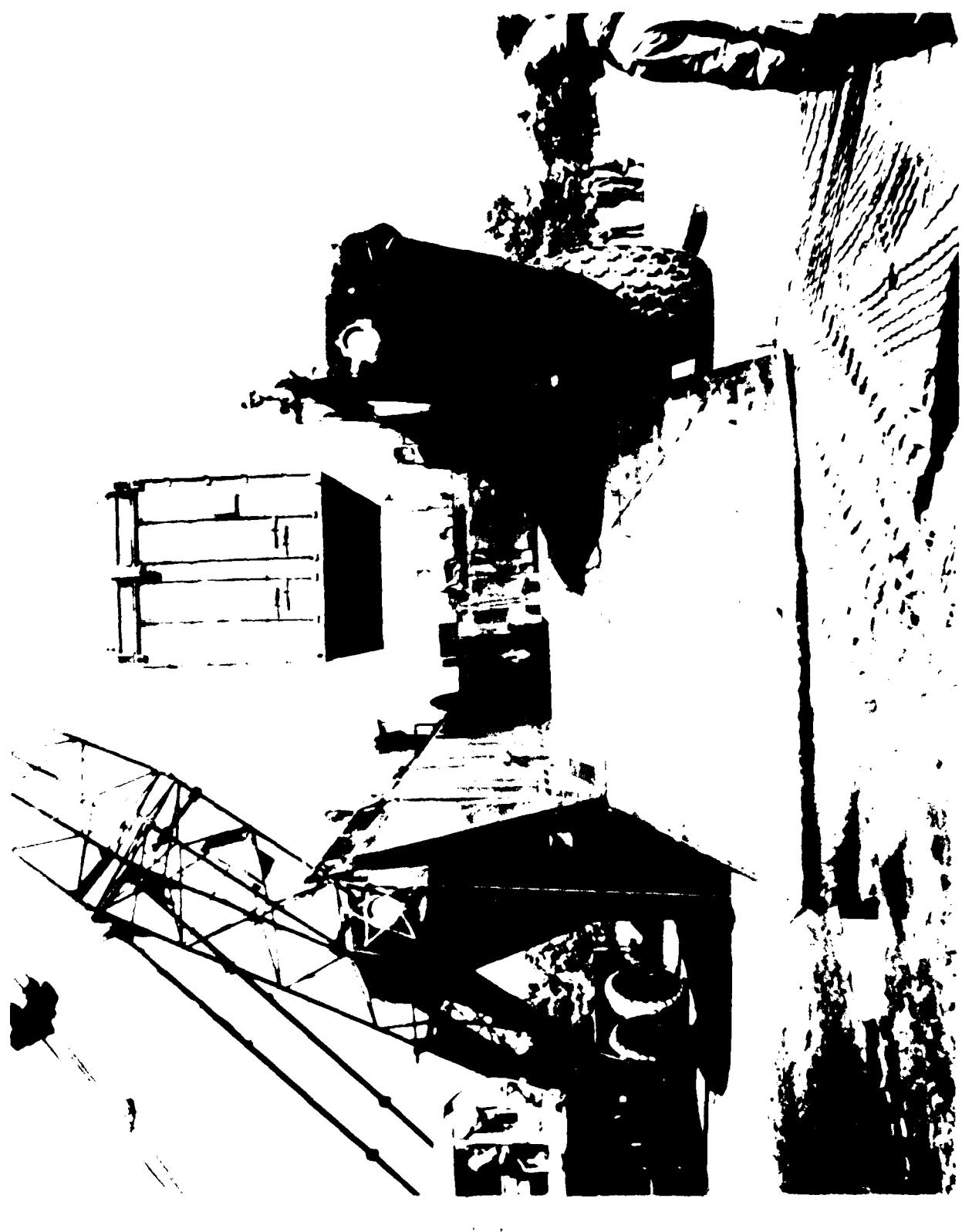


FIGURE 5.7G. LARG-17 UNIDENTIFIED INCIDENTS: A photograph illustrating the effect of the treefalling site by a lightning strike.



FIGURE C.71. FRONT-ENDER CLEARS CONTAMENTS. Once a vehicle was unloaded a frontloader drove over side-loader was used to clear the discharge point.

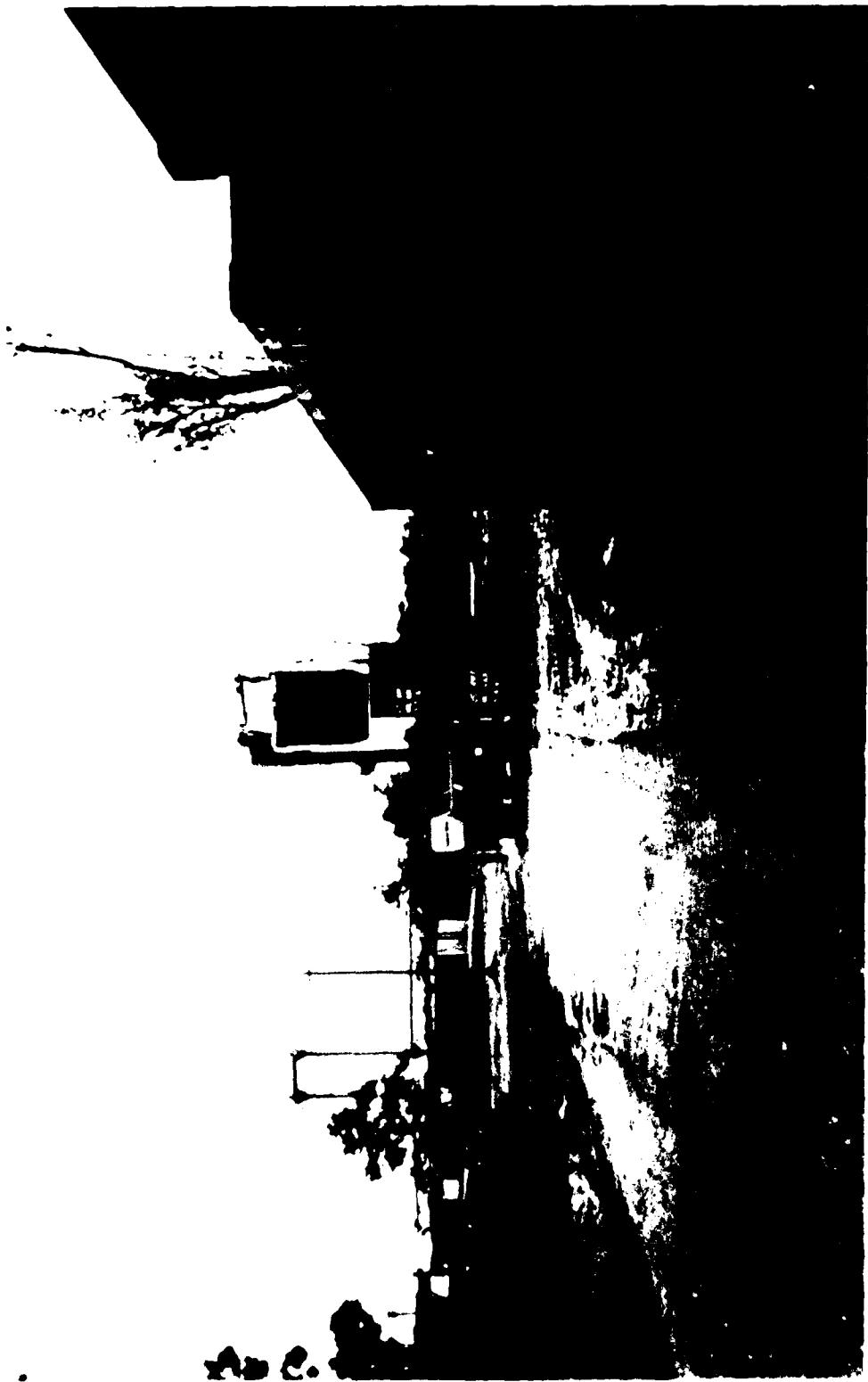


FIGURE D.72. SIDELADER SAVES SPACE. A sidelader (above) is used in the marshall area to stack two and three fully-loaded container. Two and three high stacking saves "marshalling area stowage space. The sidelader operates only on hard surfaces.

